THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXX. No. 748.] LONDON, SEPTEMBER 11, 1877. [29th Year.] Price 6d.

ESTABLISHED 1782.

GAS-WORKS

ERECTED BY

WILLIAM BLEWS & SONS,

BIRMINGHAM: 9 to 15, New Bartholomew Street.
WEST BROMWICH: Royal Eagle Tube-Works.
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MANUFACTURERS OF

IRON GAS TUBES AND FITTINGS, CHANDELIERS, & ALL ARTICLES REQUIRED FOR GAS OR GAS-WORKS.

Reference to upwards of 200 Gas-Works erected or supplied with Materials by WILLIAM BLEWS & SONS.

GENUINE TORBAY PAINT

AND

SPECIAL GASOMETER PAINT.

Four Prize Medals. Established over 20 Years.

These Paints are now used in 150 Country Gas-Works, and by all the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.

They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.

The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.

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WOOD GRIDS

FOR

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BLAYDON BURN, BLAYDON-ON-TYNE.

Were the only parties to whom a Prize Medal was awarded at the Great Exhibition of 1851, for "Gas-Retorts and other Objects in Fire-Clay," and they were also awarded at the International Exhibition of 1862, the Prize Medal for "Gas-Retorts, Fire-Bricks, &c., for Excellence of Quality."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

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Jos. Cowen & Co. are the only Manufacturers of Fire-Bricks and Clay Retorts at Blaydon Burn.

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J. R. & Co., Ld., make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.

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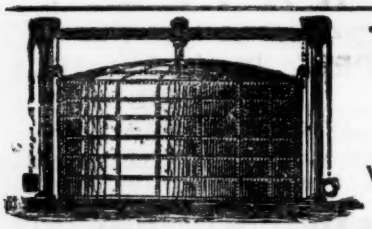
Now ready, GAS CHANDELIER BOOK (Reduced Prices), 7s. 6d.



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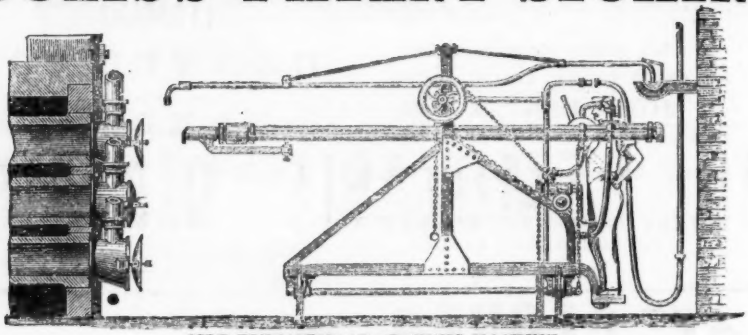
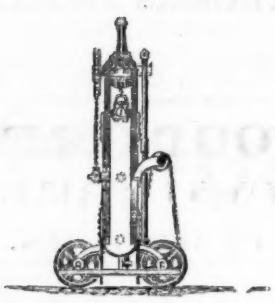


SIDE ELEVATION OF DRAWING MACHINE.



END ELEVATION.

(The Charging Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz; Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

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SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 1000 days, and are yet in good order. References on application.

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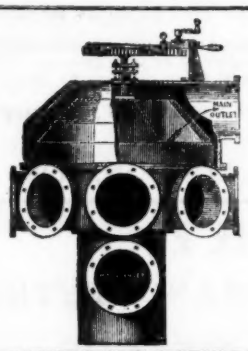
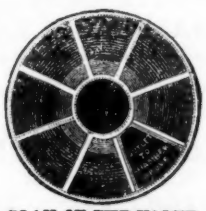
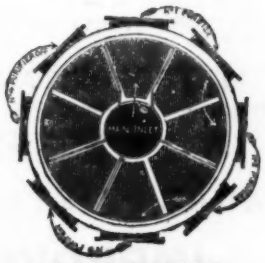
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

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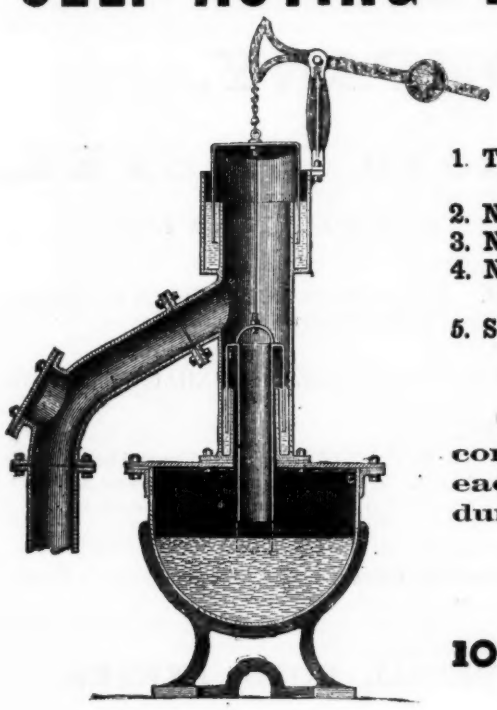
SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

These Dip-Pipes can now be supplied complete, except the flanched bend, for £4 each, which includes the charge for licence during the whole term of the patent.

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Who fix the Dip-Pipes, at a small Charge, when required.

JOHN ABBOT & CO., LIMITED,

MANUFACTURERS OF

IMPROVED

HYDRAULIC CRANES & HOISTS,

Effecting an IMMENSE SAVING in the cost of discharging Coals from Vessels, Barges, &c.

HYDRAULIC RAMS FOR LIFTING AND LOWERING PURIFIER COVERS.

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INVENTORS AND PATENTEES OF THE

FRICTIONLESS DRY GAS-METERS,

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In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

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STATION-METERS OF ALL SIZES, with PLANED JOINTS;

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NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

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WET AND DRY GAS-METERS,

STATION-METERS, GOVERNORS,

PRESSURE AND EXHAUST REGISTERS,

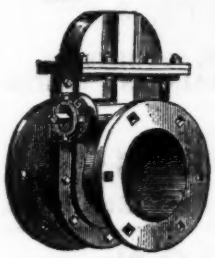
LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.

B. DONKIN & CO.'S

IMPROVED GAS-VALVES

WITH WROUGHT-IRON PINIONS.



List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.

These Valves are proved on both sides to 30 lbs. on the square inch before leaving the works, and are kept in stock.

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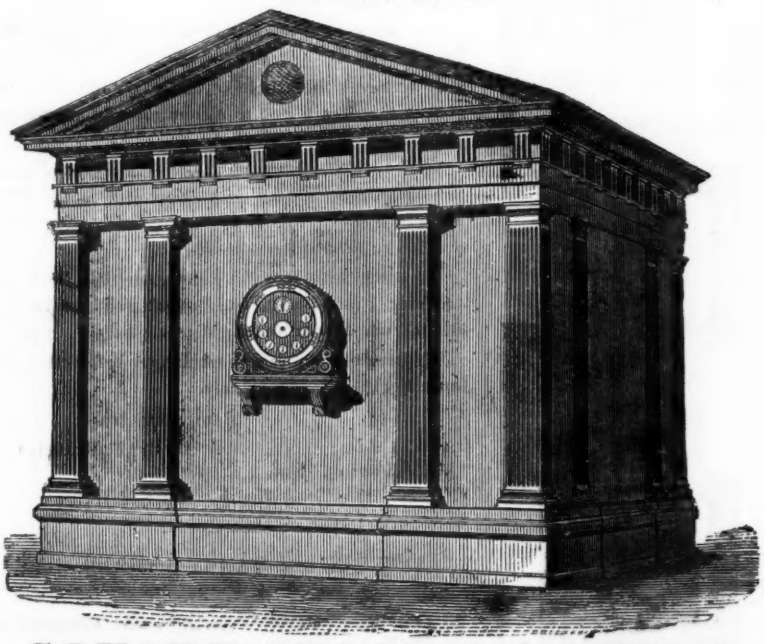
ON CAST-IRON STANDS.



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GAS PURIFIERS & SCRUBBERS.

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RENOWNED

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MADE BY MACHINERY

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WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,
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Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.
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No. 8, Self-Lubricating Packing, any size, 1s. 8d. per lb. This Packing supersedes all other kinds for High and Low Pressure Steam and Pumps. No. 7, 1s. per lb. No. 5, Self-Lubricating Double-Twisted Soft Laid Cotton Packing, 1s. 8d. per lb. No. 2, Cotton and Soapstone, 1s. per lb. No. 6, Canvas Rope, with India-rubber Core, 1s. 8d. per lb. Canvas made from all Long Flax. Any Quantity can be forwarded from 1 lb. upwards, and carriage paid on ¼ cwt. and upwards to any Railway Station in the Kingdom. Tarred and White Yarn for Pipe-Joints, Torch Yarn, Coke Sacks, Fall Ropes, Cotton Waste, &c., at various prices, according to quality.
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BRETTELL'S ESTATE
FIRE CLAY & BRICK WORKS,
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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.
Successors to
F. BARBR AND CO., LATE BRIERLEY HILL, STAFFORDSHIRE.

HARPER & MOORES,
PROPRIETORS OF THE
BEST STOURBRIDGE CLAYS,
STOURBRIDGE.
Manufacturers of all Descriptions of
BEST STOURBRIDGE FIRE-BRICKS, LUMPS, AND CLAY RETORTS
Of all Dimensions for Gas-Works,
GLASS-HOUSE POTS & CRUCIBLES
Of every kind.
The Highest Award was obtained by H. & M., at the Philadelphia Exhibition, 1876, for Superior Quality of Manufacture.

"SELLARS' CEMENT"
PREVENTS WASTE OF GAS FROM RETORTS;
SAVES CLAY RETORTS FROM DESTRUCTION BY FIRE;
GREATLY ECONOMIZES THE USE OF FIRE-BRICKS;
And PREVENTS ALL POSSIBLE LOSS of GAS FROM LEAKAGE.
J. C. SELLARS,
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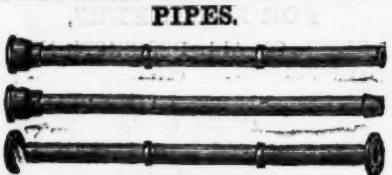
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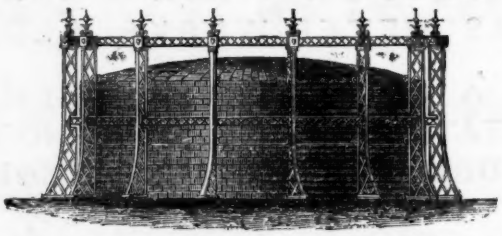
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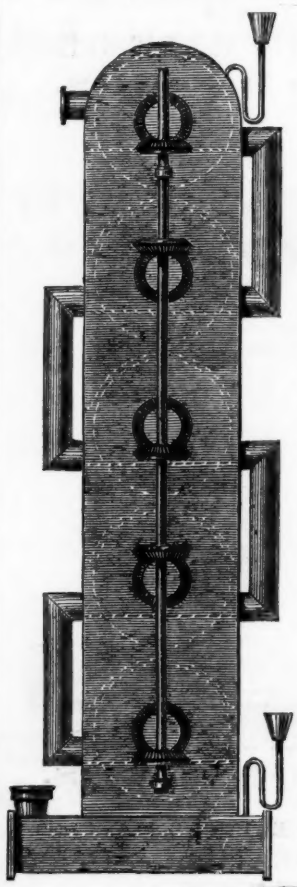
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The brushes cause no appreciable increase of pressure, and there is no repumping of liquor. Clear water run in at top, issues from the bottom fit to proceed to the sulphate-house.
It performs its work more efficiently than the tower scrubber I have, while only about half the height, and not one-fourth its weight or capacity.
My purifiers also last much longer before they are foul than they did previously.
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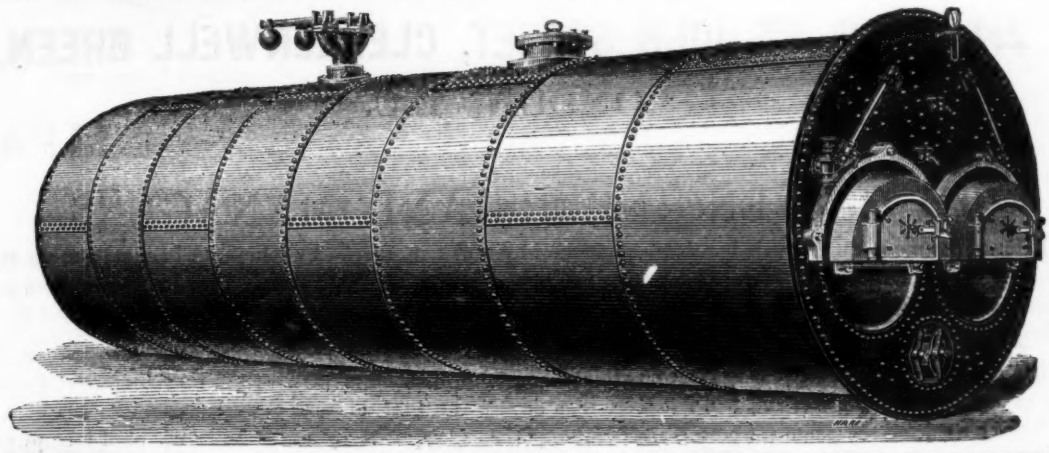

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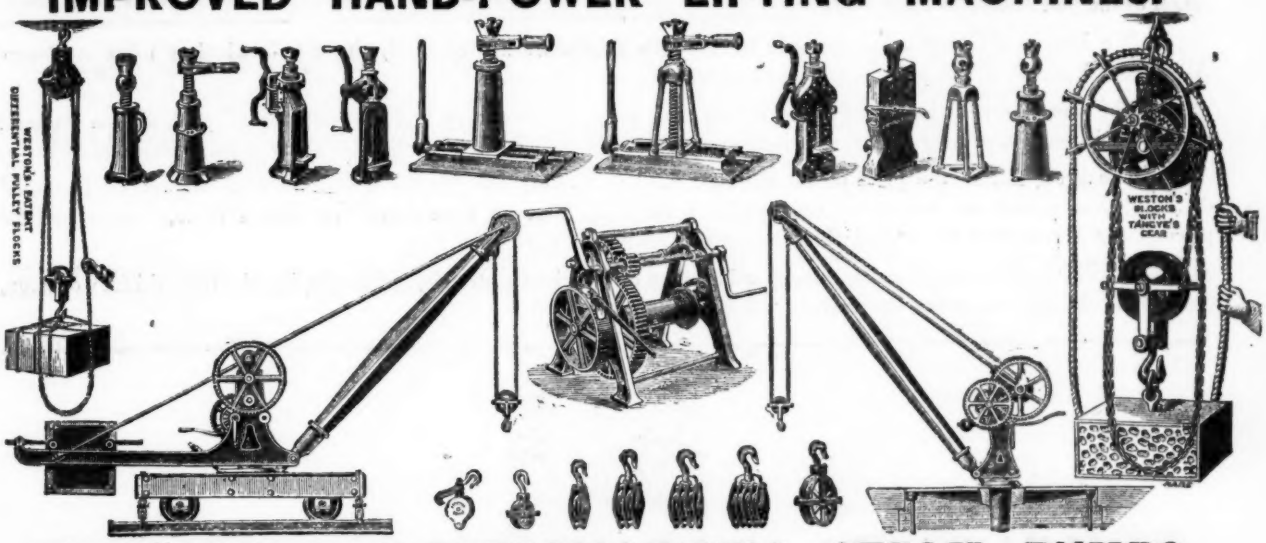

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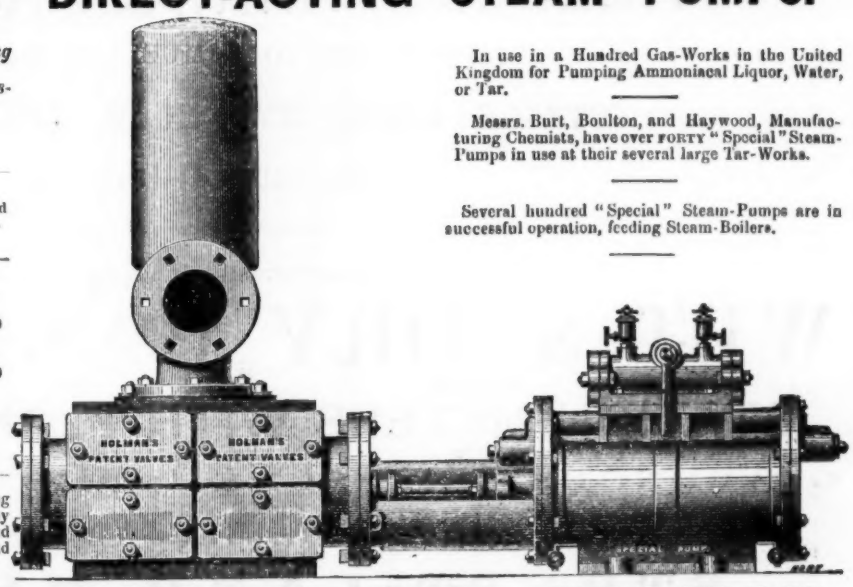
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,350*	50
7	7	12	9,750	50
10*	7	12	9,750*	65

* These sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance piece between steam and pump cylinder at a small extra cost.



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LONDON, E.C.

TO GAS ENGINEERS AND MANAGERS.

It having come to our knowledge that a report is in circulation, spread by some unprincipled person or persons, that the cases of our larger-sized Meters are made of Galvanized Iron, we think it only fair to ourselves, and just to our customers, to say, that we never have used, in making any of our Meters, a single pound of *Galvanized Iron*, or any other *cheap* and *inferior material*, and this can be easily seen by opening any of them.

The cases of our large-sized Meters, from 20 lights and upwards, are all made of the very *Best Best Patent Alloy*, which is nearly double the price, and will last more than double the time, of some other material that has been and still is very largely used for the same purpose. And our experience, acquired by an extensive use of it for upwards of 30 years, enables us to say with confidence that no other metal in use for the purpose is so little liable to corrosion from the action of the gas.

We have now in use a Meter made in 1848, and therefore 29 years old, the case of which is made of Patent Alloy; the Meter is still in perfect order, and shows no signs of decay.

The utmost care is exercised by us in selecting none but the very best materials for all parts of our Meters; much of it is made *expressly for us*, as it is not possible to obtain it in the open market of the same superior quality.

The great fall in the price of all materials used in making our Meters has enabled us to give an increased discount, thus giving our customers the benefit of the fall. This we were bound in fairness to do, as we raised the price of our Meters four years ago, when the price of all metals went up.

It will be our constant endeavour, by using none but the best materials, and employing the most skilful workmen, to maintain the high character our Meter has hitherto borne.

WILLIAM PARKINSON & CO.

(SUCCESSORS TO SAMUEL CROSLEY,)

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STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

W. M. S.—*The sulphur in spent oxide is estimated by placing 50 grains of the material in a funnel tube, and rinsing it with bisulphide of carbon. When all the sulphur is dissolved out, which may be known when a drop of the liquid collected on a glass plate leaves no residue on evaporation, the bisulphide may be distilled off, and the sulphur left behind may be weighed. Messrs. Wright and Co., of Westminster, will supply you with the necessary apparatus.*

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 11, 1877.

Circular to Gas Companies.

The eleventh report of the Warden of the Standards has just been issued. We learn from it that Mr. T. H. Farrer, the Permanent Under-Secretary of the Board of Trade, has added to his former multifarious duties those of the Warden of the Standards, and we think we may safely assume that he accepts the emoluments of the office. It is going somewhat out of our line to object to this concentration of offices. It may be beneficial to the public, if it involves a reduction of expenses; but, as these things are generally managed, they simply result in injustice to the working officials, who lose all chance of promotion.

We pass to the report, which we may say at once is, as regards gas matters, of the most meagre description. The deficiencies of the Sale of Gas Act, which are here presented as novelties, were discovered very soon after the passing of the Act. To deal with them in the order in which they are put in the report, we may remark that the absence of any provision in the Act to make compulsory a regular reverification of the apparatus used in testing meters, was very early pointed out as an important omission. The matter was a good deal discussed in 1868-9; and, in 1870, a Royal Commission, appointed to inquire into the condition of the Exchequer Standards, strongly recommended that the omission should be supplied by a fresh enactment. The reverification of the "beautiful" models deposited in the cities of London, Edinburgh, and Dublin, recently effected, was, perhaps, desirable. We doubt whether either one has ever been used; but unused apparatus generally goes to rot, and, in view of legislation which would compel their employment, it was certainly advisable to have them verified.

With regard to the instruments actually employed in testing meters, we consider that their periodical reverification is most important. But of far more consequence than any testing of the measuring capacity of a meter, is the careful examination of the registering apparatus. The necessity for this was pointed out by the Astronomer Royal in reports to the Privy Council, the first, we rather think, being made in 1860. In both, we believe (we have not the reports before us, and speak from memory), he gave instances of defects in construction which caused large errors in registration. The Commission of 1870 also recommended an examination of the wheel-work of meters, and the report of the Warden of the Standards, published in 1871, contained an able paper by Mr. Chaney on the same subject, which showed clearly the necessity for an examination of the registering part of the meter, before its accuracy could be certified. Mr. W. Sugg joined in the discussion which followed the publication of that paper, and pointed out how, by some alterations in its construction and attachments, the registering apparatus might be made easily removable from the meter-box, so that the revolutions of the whole train of wheels could be observed.

In the report we are now noticing, allusions are made to cases brought to the knowledge of the Board of Trade of alleged exaggerations in registration, which could only have resulted from defects in the registering apparatus. We wish Mr. Farrer had given us some details, for, as the matter stands, we have simply the allegations of the consumers who have complained to the Board. The Torquay story appears to us very improbable, and we should like to know how the alleged enormous excess of registration was ascertained. The special defects in the apparatus, which led, in the other two cases, to erroneous estimates of the consumption, ought also to have been published, and the suppression of these details we regard as a grave fault.

It must not, however, be supposed that consumers alone suffer from mistakes or defects in the construction of the registering apparatus of meters. In our issue for July 21, 1874, will be found reported the case of the *Imperial Gas Company v. Hammond*, which was heard at the Clerkenwell Police Court. The Company sued the defendant, who used his own meter, for the value of 20,000 feet of gas. In this instance it was "accidentally" discovered that the wheel of the meter, which registered hundreds of thousands, had sixty-three teeth, when it should have had only sixty. The consequence was that at every revolution it registered five thousand feet less gas than was consumed. Now, it is impossible to suppose that a pattern was made for one particular casting, and we are certain that no meter maker would lend himself to a fraud of this kind. The probabilities are that a blunder was made by a stupid pattern maker, and that there are a large number of meters in use having a similar wheel. We quote the above as a proved instance in which a Gas Company suffered from an error in construction, and we adduce it as well, as an illustration of the necessity for legislation compelling the examination of registering apparatus before meters are stamped as correct.

One cause of these erroneous registers may, we fear, be found in the competition among meter makers, who all desire to supply their instruments at the lowest possible price. Now, the mechanism of a meter should be made and adjusted with all the care that is devoted to the manufacture of a good clock. Nobody ever heard of a clock-wheel with too many or too few teeth, but we are reluctantly compelled to suspect that such accidents must be frequent in the case of meters. It is true that in the case of the clock the error would be discovered in the course of twenty-four hours, while a meter may go on for years before a suspicion arises that something is wrong with the works.

The defects in legislation, pointed out in this report, and the remedies for them, may be said to have been before the public

for at least ten years, and yet nothing has been done. The blame lies with the Board of Trade, who will now be stirred into activity by the appointment of Mr. Farrer to the Wardenship of the Standards; and, in all probability, next session we shall see introduced a Bill to amend the Sale of Gas Act. There is now no further opportunity of harassing Gas Companies. The sliding scale and auction clauses are accomplished facts, and time may now be found to promote some useful practical legislation.

The quarrels of Gas Companies with Local Authorities as to the price at which public lamps shall be supplied is leading to an extension of lighting by petroleum oil. At present, we believe, Winchester, Poole, and Barking are lighted by means of oil lamps. The Romford Local Board have recently decided to adopt oil, and the Corporation of Bristol and the Local Board of Guisborough are considering whether or not they shall adopt the same system. A deputation from the Corporation of Bristol went to Winchester last week to see and learn for themselves all about petroleum lighting. They found, we understand, that the light given by the lamps, though whiter and brighter than that afforded by gas, did not diffuse well, and that the reservoirs at the bottom of the lanterns, even when made of glass, cast a deep shadow immediately under the lamp. They were told that, for the present year, the contract for lighting the city is ten per cent. less than that offered by the Gas Company; but it was judiciously pointed out to them that, next year, the conditions may be reversed. The increased use of petroleum must necessarily lead to an increase of price, and the well-owners in Pennsylvania take every opportunity of adding to their rate of charges. There is a strong opinion that the wells will not last out many years, and the necessity for "making hay while the sun shines" is generally recognized by the lucky people who have "struck "ile." We shall be told, of course, that there is petroleum all over the world; but when it is brought to England from other sources than America, what will it cost?

Turning to the source of discord between Local Authorities and Gas Companies as to the supply of public lights, we find it is invariably a dispute about price. Now, cannot some arrangement be made which will be satisfactory to both parties? Most special Gas Acts enact that gas supplied to public lamps shall be charged for at the lowest rate paid by private consumers, except under special contract. But it is nowhere said that private consumers shall be charged for gas at the same rate as is paid by a Local Authority for a supply to public lamps. Travelling in Switzerland, some five-and-twenty years ago, we were greatly annoyed one day, at a *table-d'hôte*, by the discordant din made by a band stationed in the *salle-à-manger*, and next morning we found in our bill a charge for "music." (?) We objected to the item. "Very well," said the bland landlord, "I will take it "out; but you will pay one franc more for your bed." Well, cannot Gas Companies imitate, in some sort of way, the policy of the Swiss landlord? If Local Boards will insist on being supplied with gas at unremunerative prices, let them be gratified, and let an addition be made to the price charged to private consumers. It will not, or ought not to, involve any injustice to these latter, who will save in rates the extra charge they pay. No statutory Company, we imagine, are to-day charging the maximum price allowed them, and non-statutory Companies can charge what they like. Frankly speaking, we may say that we see no reason for these continual squabbles between Gas Companies and Local Authorities about the charge for the supply of public lights.

We have great pleasure in mentioning the fact that the Directors of the Phœnix Company have resolved on reducing the price of gas from 3s. 6d. to 3s. 4d. from the 1st of October next. That the Company can afford to make this reduction is a proof of excellent management. A very considerable portion of the district supplied by the Company is but sparsely populated, and the consumption per mile of main is relatively very small. Some time ago the Company, who had up to that time charged a differential rate in the outlying districts, equalized the price, and now consumers on Blackheath and Wandsworth Common are charged the same price as those in the densely-populated districts of Lambeth. We might here say something of the advantages of the Metropolis Gas Act, 1860, with the provisions of which the Phœnix Company have always honestly complied. They ask no more, and are entirely contented with 10 per cent., and, as they show to-day, they are perfectly willing to relinquish any chance of profit beyond that required for the statutory dividend, for the advantage of the consumers. In the course of a year or two they will be compelled to go to Parliament for power to raise further capital, and will have the sliding scale and auction clauses inflicted on them, but we doubt whether the consumers will reap any advantage, while the shareholders will certainly be injured thereby. We have, however, said so much on this matter that we need say no more to-day; and we conclude this paragraph by heartily congratulating the Company on the successful management which enables them to make the reduction we announce. Praise for fulfilling their obligations to the public is unnecessary.

The report of the Directors of the Brighton and Hove Gas Company for the past half year has been issued. It is a satisfactory document in so far as it states that the Directors are able to recommend the payment of maximum dividends. But it has astonished us to learn that the consumption of gas in the Company's district has but little increased. Few extra-Metropolitan Companies, we should have thought, have such opportunities of increasing their business as the Hove Company; and the Directors should endeavour to ascertain the reasons for the want of progress.

Our readers will see, by a letter we publish in another column, that the Directors of the Alliance and Dublin Company have accepted our suggestion, and agreed (the shareholders consent being obtained) to pay the expenses of the engineers employed by the Corporation in 1874. We regard this as an act of generosity to the Corporation rather than to the engineers. It is quite clear that the Gas Company are willing to make any concession to ensure peace and quiet, and we hope this disposition will be reciprocated by the Corporation. What advantage the Company gained from the evidence of the engineers, we are unable to say. The Directors knew well the condition of the Company's affairs, and were well advised as to the steps to be taken to raise the Company out of their depressed position. Those steps have been taken, and we are happy to say the undertaking is now in a very sound condition. And here we may congratulate Mr. Cotton on his receipt of the very handsome testimonial from the shareholders, presented last week. It was well earned; and we were pleased to see that the shareholders appreciated Mr. Cotton's successful efforts to promote the prosperity of the Company.

We publish in another column a letter from Mr. A. Vernon Harcourt. We shall not allude to the chemical question further than to remark, that we have no doubt that he and Mr. Schorlemmer, and any other competent chemist, can, by careful fractional distillation, obtain a body which may be fairly called "pentane." But the fatal objection to the employment of Mr. Harcourt's new "Unit" as a standard of comparison lies in the fact that it is not a legal standard. The law says that gas shall be compared with sperm candles. It would be all very well to say that the new Unit represents a certain consumption of sperm candles, but the lawyers would laugh if this were gravely put forward in a Court of Justice. Sperm candles are, at present, the only legal standard, and gas must be directly, and not indirectly, compared with them. Unless the law is altered, Mr. Harcourt will have wasted his ingenuity.

We report to-day a number of meetings, to which we cannot individually refer; but it is gratifying to see that they show a general state of prosperity in our industry. Coke seems, in many places, to be a drug in the market; but with the approach of cold weather and a revival of trade, things may improve, and this important residual obtain its proper value.

Water and Sanitary Notes.

Messrs. Bramwell and Easton's proposal for a new water supply for London, to be obtained from the chalk within twenty miles of the Metropolis, continues to attract much attention. We have expressed an opinion that the chalk stratum could not support a heavy drain for very many years, and in this belief we are supported by the Rev. — Clutterbuck, who, besides, points out some serious consequences which may possibly ensue from a large drain on the chalk. He refers to the fact that several of our rivers, tributaries of the Thames—notably the Lea, the Colne, the Wandle, and the Ravensbourne—have their origin in springs from the chalk, and intimates an opinion that, if a large quantity of water be pumped from the stratum, it may diminish the volume of those streams, and thus lessen the volume of the Thames itself. The idea may be a little visionary, but the matter deserves serious consideration. One point seems to have been overlooked by Mr. Clutterbuck, and that is the fact that any quantity of water pumped from the chalk to supply London would be a substitution for, and not an addition to, the drain made by the rivers. It is, however, unnecessary to go further into this matter. We feel confident the Metropolitan Authorities will never entertain the proposal in its present shape.

Another overflow of the Thames—which, though foreseen, and, as far as possible, provided against, nevertheless inundated a large district, and did considerable damage—will, we hope, induce the Metropolitan Board to reconsider their determination to resist the imposition of a general metropolitan rate to pay for

works to prevent these disasters. As we have said before, the ratepayers in the higher parts of Lambeth are as much entitled to exemption from the rate as the inhabitants of Highgate and Hampstead. These constantly recurring floods are a disgrace to the whole Metropolis, and we do hope that in the next session the Metropolitan Board will introduce a Bill for their prevention, drawn in accordance with the recommendations of the Select Committee of the House of Commons.

Earl Redesdale, though, we believe, not a sportsman himself, is evidently anxious to abridge, as far as possible, the sessions of Parliament, and, with this object, has given notice of his intention to require the earlier introduction of Bills to confirm Provisional Orders. Thereupon the Local Government Board issue a circular requesting that applications for Provisional Orders, with some exceptions, shall be deposited before the 1st of January. They might have them much earlier, and there would be plenty of time for inquiry, but for the absurd regulation that the necessary notices must be given in October and November. Why on earth should not the notices be given at an earlier period of the year? The Orders might then be deposited by the 1st of November, and the overworked inspectors would thus have four months for their parliamentary work instead of two months. As the matter stands, however, we must call our readers attention to the fact that the Local Government Board request that all Sanitary Authorities applying for Provisional Orders under the Public Health Act will deposit their proposed Orders by the 1st of January.

The Select Vestry of Richmond (Surrey) are, as we have already informed our readers, desirous of borrowing a further sum of £6000 for the completion of their water undertaking. The request for permission to do so, necessitated an inquiry by the Local Government Board, and Major Tulloch was sent, not merely to inquire into the financial circumstances of the Vestry, but also as to the present condition of their water supply. Unfortunately, we have not a full report of the proceedings, nor is, as yet, Major Tulloch's report available; but we gather that the inhabitants of Richmond are still supplied from the Petersham Meadows, the water taken from thence being, perhaps, supplemented by an additional quantity, taken from the "Leg of "Mutton" pond in the park. Both of these sources are greatly contaminated. The water from the former percolates through the soil from the Thames, and is tidal water contaminated with sewage. That from the latter source is scarcely less objectionable. It seems that extremely slow progress is made with the well from which the Vestry have promised to give the inhabitants a pure, wholesome, and liberal supply. The Vestry are making a great experiment. If there be no outbreak of zymotic complaints in Richmond, we shall be more than ever convinced that water has nothing whatever to do with the production of such diseases.

WATER SUPPLY OF CITIES AND TOWNS.*

Third Notice.

The notices of this work previously given, on the History and on the Theory of Water Supply, bring us to a third division—the application to practice of the principles laid down by the author.

An entire chapter is devoted to "the considerations which influence the choice of a source, and the different systems of water supply," while the remaining chapters treat in greater detail of the separate and more prominent parts of each system.

Reservoirs that furnish a water supply by gravitation alone, and those with reservoirs, as Cropstone, for the supply of part of the town of Leicester, as illustrations where the water is raised to a reservoir higher than its source, are regarded as exceptional cases, but the first in order for consideration.

The next class of water-works is that in which the supply is from rivers too large to be impounded, as in the former class, a part only of the flow being abstracted. Large supplies are sometimes derived from springs, but a more general source is some deep water-bearing stratum of the earth's crust, from which it is drawn by means of wells. The quantity of water to be provided, based upon the population of the district, is the next element. Under this head the quantity consumed per head of population is stated to vary from 14 to 15 gallons per day, as in Norwich, up to 50 gallons, as in Glasgow. The reasons for such a great difference are examined, and the influence of water-closets on water consumption is treated of, the conclusion being that 10 gallons per day may be regarded as a full net allowance for domestic purposes, disregarding waste. The subject of waste is well stated, and in his concluding sentence the author remarks that "waste ought to be curtailed, but it is a far higher duty to encourage the use of water than to increase the dividends of water companies."

Street-watering and other general public purposes are estimated to average about one gallon per head per day, and trade or manufacturing purposes require a supply of from one to eight or nine, according to the uses to which water is applied.

In addition to the consideration of the quantity required comes the element of quality, and beyond this, as in all other works, arises the consideration of cost. This latter, it is stated, "is mostly a question of dividend rather than of what is really best for the consumers." And again: "Far too frequently is it preferred to swallow the impurities, and make shift with the scantiness of the existing supply, than to favour a liberal scheme." We are far behind the "ancients in our estimate of the value of water for personal use; and so mercenary have become our notions in the pursuit of 'economy,' that even in the paramount question of health and comfort the purse is supreme. The truest economy will mostly be found in selecting that source which will secure a liberal quantity of water of unimpeachable quality at almost any cost."

Gravitation works, with their several contingencies of area of gathering-ground, strata, rainfall, evaporation, are examined; also the interests of millowners, and how these affect the available supply, illustrations being given of far too great a length for even an abstract.

Works for which the water is pumped or taken from a river are given with many details, and then follows the subject of wells.

In the chapter on this subject we find remarks on "shallow wells," as distinct from "deep wells," these latter being classed as "ordinary" and "artesian." The causes of failure are considered, and we have detailed to us the geological features of what are known as the Paris and the London basins. These particulars have no special novelty; but when we come to the subject of well-sinking, we have as full an account of the several processes as we have as yet seen, with details of the tools, machinery, and plant under the several circumstances that arise in different localities, with illustrations, we should think, of every known contrivance for carrying out such works.

It is quite impossible within our limits to give an idea of the complete manner in which the subject of "Reservoirs" has been treated. The several uses to which they are applied, their capacity, the amount of rainfall collected, drought, and evaporation, are all considered; and then follow practical details, such as the construction of "dams," and the arrangements for drawing off the water—these latter all important when considered as affecting the stability and soundness of the dams in which they are constructed.

Various modes of purification are considered, illustrated by sections of the filter-beds of the several London water companies.

Following the above is a treatise on "Pumps and Pumping Machinery," and descriptions of the boilers used for supplying the engines at various works. Conduits of various sections are given, followed by a series of details respecting the distribution of water in mains, in the consideration of which are introduced highly interesting particulars, the collection of which has evidently been a labour of love. We have joints, valves, hydrants, meters, service-pipe, and house-fittings, the last mentioned bringing to notice the most recent inventions on the subject of prevention of waste.

When we add that these details are followed by a chapter on the "Law and Economy of Water-Works," tables giving the cost under various circumstances, and the charges made at various towns; that there are 49 double plates of illustrations, and a number of specifications from which works have been executed, it is not too much to affirm that this work on water supply, for practical utility, takes a very high position. It is a real pleasure to see such ability and painstaking directed towards a subject which is, without question, one of the most important for present investigation in this great Metropolis.

* "A Comprehensive Treatise on the Water Supply of Cities and Towns." By William Humber, Assoc. Inst. C.E., Memb. Inst. M.E. London: Crosby, Lockwood, and Co., 1876.

Birkenhead Gas Supply.—The Birkenhead Improvement Commissioners, at their meeting on the 4th inst., appointed Mr. William Wood, of Barrow, to the office of resident gas and water engineer, at a salary of £400 per annum.

Reductions in the Price of Gas.—The Phœnix Gas Company (London) have announced that from the 1st proximo the price of gas throughout the whole of their extensive district will be reduced to 3s. 4d. per 1000 cubic feet. The directors of the Sheffield United Gas Company intend to reduce the price from 2s. 10d. to 2s. 9d., on the 1st of January next. At Wellingborough the price has been reduced from 4s. 6d. to 4s. 2d. At Ashbourne the price has been reduced to 5s., with discounts.

Complimentary Dinner to Mr. C. A. Craven, of Dewsbury.—Mr. Craven, who is on the point of leaving England for Pernambuco, was entertained by a number of his friends at the Queen's Hotel, Leeds, on Thursday last. Mr. H. Woodall presided, Mr. Dempster occupied the vice-chair, and there were also present the Mayor of Dewsbury and about 30 gentlemen representing important gas-works throughout Yorkshire and Lancashire. In proposing the health of Mr. Craven, the chairman made feeling reference to his many excellent qualities, and concluded by presenting him with a valuable gold watch, subscribed for by many in addition to those present at the banquet. Mr. Dempster, in seconding the toast, presented a beautifully illuminated address. The dinner was excellent, and the occasion was in every respect one to be remembered with satisfaction by all there. A gold locket and chain were presented by the same company to Mrs. Craven.

Shrewsbury Water-Works Company.—The half-yearly meeting was held on the 27th ult.—Mr. G. M. Salt in the chair. In their report the directors referred with satisfaction to the large balance standing to the credit of revenue account, and again recommended a dividend at the rate of £5 10s. per cent. per annum. A special report having very recently been submitted to the shareholders, the directors were not aware of any other matter that required notice in their report. The revenue account showed that the cash in the bank in December last was £588 7s., since which time £1750 4s. 2d. has been received for water-rates and for rental of property, making £2638 11s. 2d. The balance in the bank on this account was £1210 18s. 9d., and there was a reserve-fund of £1496 11s. 4d. The report was agreed to, and the dividend recommended in the report was declared. The chairman, alluding to the intended sale of the company's works to the corporation, said the highest price for which shares had sold was £55, and the sale of the works would bring £70 per share, so that an allowance had been made in the estimate for a prospective increase in the value of the undertaking.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CXLV.

VALVES (*continued*).

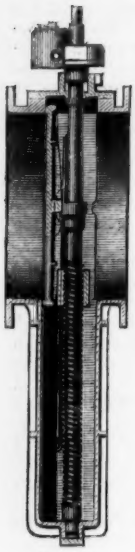

FIG. 25.

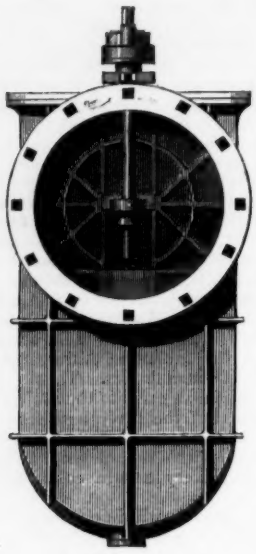

FIG. 26.

FIG. 27.

FIG. 29.

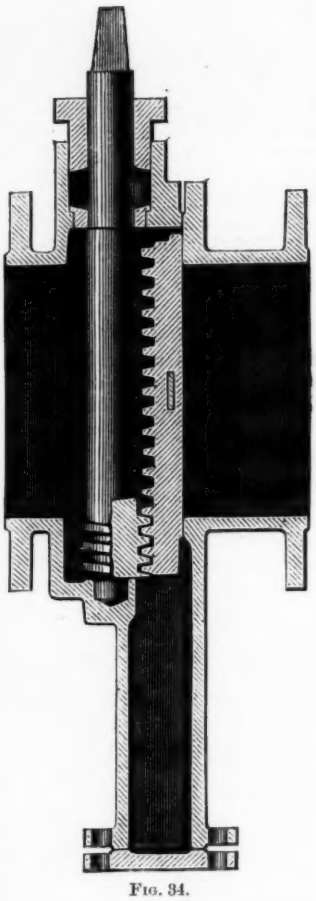

FIG. 34.

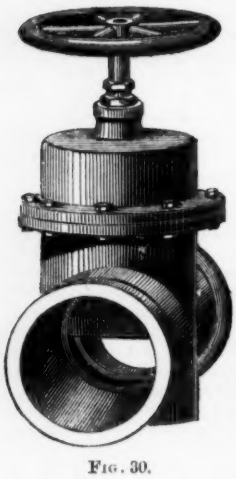

FIG. 30.

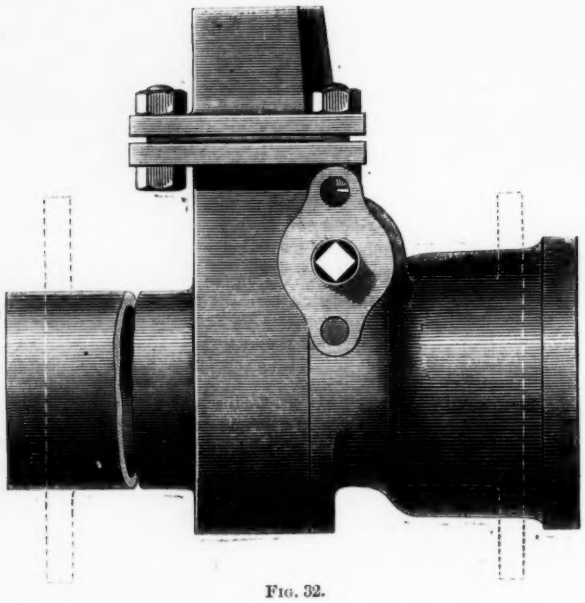

FIG. 32.

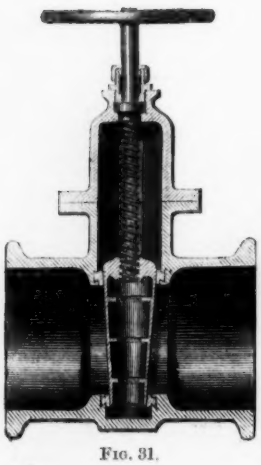

FIG. 31.

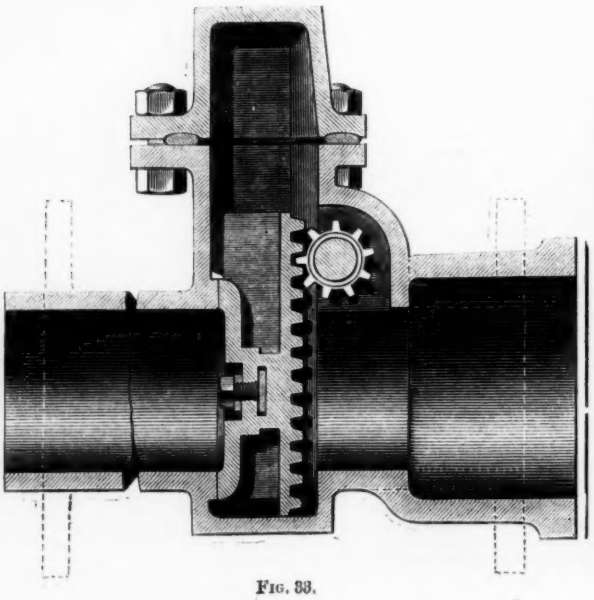

FIG. 33.

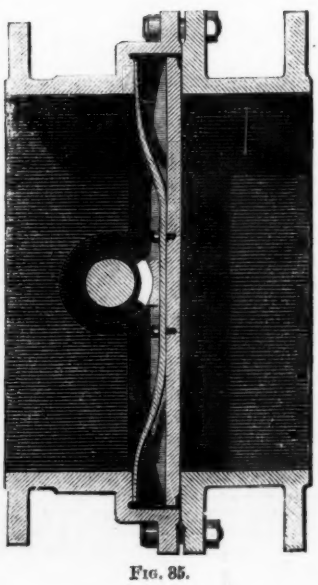

FIG. 35.

Messrs. Mann and Owen's improved gas-valve is represented in the subjoined woodcuts. Fig. 25 is a sectional view; fig. 26, an elevation; and fig. 27, a plan. The valve can, of course, be made to open either upwards or downwards; the latter form is shown in the engravings.

This valve is so constructed that the surfaces of the slide and those of the body of the valve are not in contact during the operation of opening and closing; but as soon as the slide is shut down, which is accomplished either by a screw and nut, or a rack and pinion, a cam, shown in fig. 28, connected with the spindle, comes into action, and, bearing against a plane cast on the back of the slide, forces the latter tightly against the face. In the act of opening, a turn of the screw or the pinion-spindle releases the pressure, when the only force required to open the slide is that due to its own weight.

FIG. 28.

The advantages offered by this form of construction will be apparent. The surfaces are not subject to wear and tear from friction, so that no irregularities can be produced thereon by the working, and the pressure brought to bear upon the slide by means of the cam is such as to ensure absolute tightness. This valve is especially suitable for use on purifier connexions, where each valve, when shut, has crude gas on one side, and purified gas on the other. A slight spring is attached to the valve, which scrapes the surface from any deposit every time it is operated. Fig. 29 is an enlarged view of the index-plate secured to the top, on which a pointer, actuated by the spindle, shows the position of the slide.

Chapman's (American) gas-valve, figs. 30 and 31, is of very superior construction, the seats being made of an alloy similar to Babbitt metal, which is not affected by corrosion under any circumstances. From the formation of the gate and seat, it is not liable to set fast, while it may be relied on to shut tight at all times.

The gas-valves made by Messrs. Simpson and Co. are shown in figs. 32 to 35. This firm are, perhaps, the oldest makers of this class of work in London. Their valves have a wide reputation, being well known for the strength and simplicity of their design. Figs. 32 and 33 show their original pattern of valve, made either with socket and spigot, or with flanges. Fig. 34 and 35 exhibit one of a new design. This opens from the top downwards, the slide fitting against the face all the way. On the valve-seat is a wedge, which, entering into a socket at the bottom, keeps the slide tight up to the face, independently of the pressure exerted by the spring.

(To be continued.)

Communicated Article.

NOTES ON THE ANALYSIS OF GAS COALS.

By T. O'CONOR SLOANE, A.M., E.M., Ph. D.,
Chemist of the New York Gaslight Company.

The determination of ash in coal appears a very simple matter, yet I have on several occasions experienced much difficulty in reaching accurate results. I traced the error, finally, to insufficient pulverization of the coal.

A sample of coal was reduced to powder, and passed through a fine wire sieve, No. 60 or 80 mesh. I made a number of determinations of ash, using different weights of the coal, and got the following widely discordant results:—

a.	3 grammes	6·66 per cent.
b.	12 „	3·72 „
c.	1 gramme	4·67 „
d.	2 grammes	4·40 „
e.	12 „	2·63 „

I then took all that was left of the pulverized coal, spread it out upon a sheet of glazed cloth, and divided it into two parts, each of about the same weight. I did this with the usual precautions adopted in sampling, so that the coal in each would be exactly the same.

One of these parts was ignited and incinerated. Its weight was 23·9665 grammes. The ash weighed ·9920 grammes, or

f.	23·9665 grammes	4·14 per cent.

The other portion was powered in a porcelain mortar until it was of a full brown colour. The ash was determined in it once, giving the result below:—

g.	1 gramme	3·90 per cent.

I have since this investigation subjected every coal I was about to analyze to a fine powdering in a porcelain mortar. I am of opinion that it would be well to prolong the operation in an agate mortar, but the process is too tedious. Though the coal be reduced to a brown powder, it is still quite difficult to obtain good duplicate results. I give below some instances:—

	I.	II.
Coal A	4·50 per cent.	and 4·00 per cent.
Coal B	5·25 „ „	5·12 „
Coal C	13·86 „ „	14·10 „
Coal D	5·82 „ „	5·75 „

The ash I generally determine in one gramme of the coal. If the crucible in which the incineration is being conducted be supported on the triangle in an inclined position, and if the lid be so placed as to direct the exterior zone of the flame into it, the operation will be greatly abridged. By looking into the crucible while it is over the burner, it can be seen when the right position has been reached. The cake of coke will appear bright, or ignited, on the surface. From time to time it may be rubbed, or broken up if possible, with a platinum wire. Before incineration the sample should be ignited in the same crucible with the cover on.

The sulphur may be conveniently determined by fusion with the salt flux ("Fresenius," Vacher's Ed., p. 127). One gramme of the coal is fused with a mixture of

Sodic chloride	24 grammes.
Sodic nitrate	8 „
Sodic carbonate	4 „

Frequently a mixture of equal parts of sodic nitrate and carbonate is employed, sixteen parts of the mixture to one of coal. With this the reaction is less violent, all can be at once introduced into the crucible, and immediately fused. The coal mixed with the deflagrating flux, on the contrary, has to be thrown into the hot crucible a little at a time, so that it exacts more attention and trouble. The salt fusion in two comparative determinations that I made gave higher results on the same coals.

	Salt Fusion.	Deflagration.
Coal A	1·70 per cent.	1·37 per cent.
Coal B	1·92 „	1·69 „

The specific gravity cannot be satisfactorily determined without the specific gravity bottle. By weighing lumps in the air and in water, all sorts of results will be obtained.

I break up a sample in an iron mortar, and pass it all through a No. 4 or No. 6 sieve. I then shake it up in a No. 15 or No. 20 sieve, so as to free it from the dust and fine particles. This seems a bad practice, yet cannot well be avoided. The finely divided coal, if left in with the rest, will float on the surface of the water used in determining its specific gravity, and no amount of boiling will make it sink.

The coal thus prepared I place in a small beaker with some distilled water, and boil it. I then put it, water and all, into the specific gravity flask, fill it up with recently boiled distilled water, and cool it in water, or in the air, to about the temperature of the room. The last cooling is done in a beaker of water, which is stirred once or twice during the cooling, to make the water of uniform temperature. When the bottle and contents have attained this temperature, the bottle is carefully filled, the stopper put in, and the whole dried and weighed. The coal is then thrown out, the bottle filled with recently boiled distilled water, brought to the same temperature as before, and weighed. This careful reduction to one temperature is very important; by paying attention to it, very close duplicates can be obtained.

The specific gravity of coal varies with the per centage of ash, yet the correspondence is not so perfect as to make it a substitute for the determination of the latter constituent. As the degree of correspondence is a matter of some interest, I give below a number of parallel determinations of ash and specific gravity:

Sp. Gravity.	Ash.	Sp. Gravity.	Ash.
1282	4·02 per cent.	1327	7·23 per cent.
1300	4·08 „	1308	7·95 „
1286	4·14 „	1334	10·38 „
1296	4·68 „	1377	13·98 „
1295	5·18 „	1385	16·22 „
1294	5·78 „		

[We do not fully appreciate the value of our correspondent's methods of analysis. In our "Treatise" full directions are given for the accurate determination of the ash and sulphur in coal, and from long experience we believe these to be the best in use. Most certainly, in the determination of ash, minute division is absolutely necessary.—ED. J. G. L.]

EASTBOURNE GAS COMPANY.—The half-yearly meeting of shareholders was held on the 27th ult.—Dr. G. A. Jeffery in the chair. The directors, in their report, stated that in accordance with the resolution passed at the extraordinary general meeting of the company, held on the 26th of February last, the 500 additional B shares authorized to be issued were allotted to the shareholders, and the whole amount of the £5000 had been called up. This had enabled the directors to clear off the balance due on the capital account at the date of the last balance-sheet, and to pay £392 2s. 5d., the further expenditure on that account during the preceding six months, thus leaving a balance in hand of £4348 9s. 3d. In order to provide for the increasing demands upon the resources of the company, it became necessary to acquire additional land, and the directors were met in a liberal spirit by the Duke of Devonshire, who offered to sell to the company about three acres of the marsh land, situate on the western side of the company's premises, at the agricultural price of £120 per acre, and that offer was at once gratefully accepted. Contracts had also been entered into with Messrs. John Aird and Sons for the construction of an additional gasholder-tank in the new ground, for the sum of £2988, and with the Horseley Company, Limited, for the erection of another gasholder, of similar dimensions to the one now in use, for the sum of £2710, and these works were now in progress. Two additional purifiers had also been erected, and it would very shortly be necessary to enlarge the retort-house. This extension and enlargement of the works would entail a considerable expenditure, and it had therefore been determined to seek authority from the shareholders to raise an additional sum of £10,000 by the issue of 1000 B shares. The directors had also entered into a contract with the owners of the Pelaw Main Colliery for the supply of their gas coals, for a period of two years, from the 1st of May last, at 8s. per ton. From the revenue account, which was submitted with the report, it appeared that the receipts continued to increase, while the expenditure was less; and, in taking into account the assets and liabilities of the company in the general balance-sheet, a sum of £2218 0s. 4d. was available for dividend. The directors accordingly recommended that a dividend for the past half year, at the rate of 10 per cent. per annum upon the £20,000 original capital of the company, and a dividend at the rate of 7 per cent. upon the £9980 in B shares, be declared and paid, which would absorb £1236 10s. 3d. of the balance, and leave £981 12s. 1d. to be carried forward. The report having been adopted, the retiring directors, Messrs. Arkcoll, Jeffery, and Bradford, and the retiring auditor, Mr. Emary, were re-elected; and on the motion of Mr. Hillman, the sum of £200 was voted to the directors for their services. The meeting was then made special, and it was decided to issue fresh shares, 1000 in number, of £10 each, for the purpose of purchasing additional land, and for the construction of necessary enlarged works. It was further resolved that the new shares should bear interest at the rate of 7 per cent., and be issued *pro ratâ* to the present shareholders.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

THE NEW UNIT OF LIGHT FOR PHOTOMETRY.

SIR,—The comments which you have published upon my paper, describing a new unit of light for photometry, lead me to fear that I have not succeeded in describing with sufficient clearness the photometric process which I propose to employ.

Strictly speaking, no substance whatever can be obtained in a state of absolute purity; and, in the case of substances which cannot be purified by crystallization, or generated from substances which have been thus purified, it is not easy to accomplish or to prove more than the reduction of the amount of impurity to half per cent. or one per cent. Owing to this difficulty, chemists are accustomed to content themselves with employing substances whose degree or kind of impurity is not such as will interfere with the purpose for which they are used. It is not impossible, it is not even difficult or costly, to prepare a gallon of pentane containing less of foreign substances than would be found in a gallon of "pure" alcohol or ether.

Some years ago Schorlemmer obtained from petroleum 3 litres of pentane of definite boiling-point. The introduction into this country in large quantity of the more volatile part of petroleum, for the purpose of making air gas, has rendered the preparation of pentane a comparatively easy matter. The only preliminary to rectification which seems desirable is to shake up the light petroleum, first with oil of vitriol, and then with a solution of soda.

If nearly pure pentane cannot be prepared in sufficiently large quantities to form, when mixed with air in definite proportions, many cubic feet of an illuminating gas of known and constant composition, the method of photometry which I propose is baseless and impracticable. Whether this substance can be readily prepared in a nearly pure state is a question of experimental fact. I have prepared several gallons of what I believe, from the observation of its boiling-point, and the determination of its specific gravity, vapour density, and composition, to be nearly pure pentane; and I will gladly send a sample to any one of your readers who may be in a position, and may wish to check my results.

An unit of light which continually needed to be verified by comparison with a sperm candle would be worse than valueless. The comparison of the results obtained, by determining the illuminating power of a given sample of coal gas by means of sperm candles and the new unit of light, alternately, which is given at the end of my paper, was made to test the accuracy with which the new unit had been adjusted to correspond to the light of a sperm candle. Such a correspondence as I have explained is desirable for the sake of retaining the existing nomenclature of photometry. And if the new unit should be brought into use instead of candles at the metropolitan testing-places, it would be essential to establish the relation between the two, and convenient that the relation should be that of equality. But, this relation having been once established, no further comparison with candles would be required. The same substance, burning under the same simple conditions, would give always the same amount of light.

I hope to convince those who may be willing to witness the process at Messrs. Wright's, that it is much simpler than perhaps it seems to be from my description, and easier, as well as more exact, than candle photometry.

Oxford, Sept. 7, 1877. A. VERNON HARCOURT.

THE TRUE INTERESTS OF GAS COMPANIES.

SIR,—Mr. Livesey's letter to you of the 25th ult. will, I hope, lead to a solution of some of the questions he with so much courageous sense points out as, in the "true interests of gas companies," worthy of attention.

With reference to the carbonization of coal, I consider that little real progress will be made until a system is adopted which will subject the coal to a practically unvarying temperature, and I think this is to be looked for in the direction of continuous charging by mechanical arrangements, or by charging in small quantities at short intervals, without opening the retort.

Patents by individual inventors are practically useless. It is unlikely that any design, however carefully worked out, would be perfected without repeated trials, considerable expense, and probably more than one partial failure; and after all, companies would keep the matter under consideration—unintentionally, perhaps—until the protection had, for want of encouragement, been allowed to expire. In short, the experience of years, and not a few disappointments, prove that several promising ideas, which appeared capable of being pushed to a successful issue, have been "nipped i' the bud" by the frosty breath of neglect, and their possibly over-sanguine originators, as a consequence, punished in purse and feelings, instead of reaping the reward which they had, with probably fair reason, expected.

If, from whatever cause, companies are really anxious to do something towards improving the present long-tried system, it might possibly be worth while to offer a substantial premium of some kind, or a number of premiums of varying values, for designs showing how it is to be done. I would suggest that the most approved plan should be rewarded, by being tried at the expense of such company or companies, who, if it proved successful, could afterwards recoup themselves, by patenting the design, in partnership or by arrangement with the inventors.

This idea, I believe, would not be unpalatable to the engineers of gas companies, who, in many cases, are prevented from experimenting, by the dread of the responsibility of failure.

The complete combustion of fuel in the furnaces is, I consider, a subject which would pay gas companies to inquire into, as there is evidently a wide margin between even the best results now attained, and what is calculated to be attainable, if carbonic acid only were the escaping product.

Regarding "payment by results," so far as applied to managers or foremen, I may state that in a small works, of which I am one of the joint managers, in which the consumption of coal is from 2500 to 3000 tons of coal per annum, I introduced some time ago a system by which the foreman is rewarded, for extra care or intelligence in the management of what more immediately comes under his control, by a per centage on more than averagely fair results. We consider that we pay him wages or a salary for due care in the conduct of our business, and we require a stated production of gas, coke, and ammonia per ton of coal carbonized. If, however, his six-monthly statement shows a real surplus on any or all of these items, and he satisfies us otherwise with due care and attention, we cheerfully pay him a proportion of what he has saved us, and my own opinion is that it is our "true interest" to do so.

34, *St. George's Road, S.E., Sept.* 7, 1877. A. F. WILSON.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

SIR,—It was intimated at the Stirling meeting of the North British Association of Gas Managers, in reference to a printed circular (of which I enclose copy), inviting a paper upon a specific subject, that only two such papers had been given in in terms of the circular. It was also intimated that a small committee had examined the same, and recommended their consignment to the waste basket, if not applied for and removed by their anonymous authors. As one of the unfortunates, I have applied for, but not yet had, my poor paper returned. I could not help feeling queer in listening, at the meeting, to mysterious remarks about the credit of the Association being compromised by allowing the contents of my paper to see the light. More than one member expressed to me how much their curiosity was excited to know something of the nature and drift of the *outré* productions so ignominiously consigned to limbo. I could not gratify their desire, but having since shown them the first draft of my paper, I have, on their suggestion, taken the liberty of putting it in your hands, so that in your reports of the proceedings, if you see fit, it may be treated in any way you think it deserves.

Forfarshire, August, 1877. W. L.

[The circular to which our correspondent refers offered a prize of the value of £10—the donor being Andrew Stewart, Esq., of Glasgow—for the best essay on the question, "Is it possible to do without the Aid of Gasholders in the Production and Supply of Coal Gas, and what Practicable Means can be suggested to serve the same Purpose?" As the paper contributed by our correspondent was not laid before the annual meeting of the Association, it could not possibly be incorporated in our report of the proceedings as he suggests. We have been favoured with a copy of it, and, as it possesses some points of interest, we have pleasure in printing it in another column. It is, of course, understood that, by so doing, we do not at all impugn the judgment of the committee of the Association, to whom was entrusted the consideration of the question whether the paper entirely fulfilled the conditions laid down in the circular.—ED. J. G. L.]

Legal Intelligence.

CITY OF LONDON POLICE COURT.—GUILDHALL, THURSDAY, AUG. 30.

(Before Alderman ELLIS.)

DESTRUCTION OF STREET-LAMPS BY RECKLESS DRIVING.

Peter Brady, a van boy, in the employ of Messrs. Lavington Brothers, carriers, Old Bailey, was summoned under the Metropolitan Local Management Acts, by Messrs. Samuel Pontifex and Co., for £1 15s. 6d., the amount of damage done to a street-lamp broken through the defendant driving one of Messrs. Lavington's vans carelessly.

Mr. H. H. WELLS supported the summons, and Mr. DALTON appeared for the defendant.

Mr. WELLS said that Messrs. Pontifex contracted with the Commissioners of Sewers to keep the street-lamps in repair, but, to their annoyance and injury, hundreds were broken every year, and the per centage of offenders they were able to detect was very small indeed. In this case the driver left the van and two horses to be driven by the defendant, a boy much too young to be entrusted with such a responsibility. The result was that he did not pull the horses off when his van was near the lamp, and damage to the amount of £1 15s. 6d. was done, which they now sought to recover.

Mr. DALTON took an exception to the proceedings, as the contractors were not the proper persons to institute them. The lamps were the property of the Commissioners of Sewers, and they ought to have taken out the summons.

Mr. WELLS said that was not necessary. He had taken out many summonses in the metropolitan districts in the same way as this, and the proceedings had always been upheld by the magistrates.

Alderman ELLIS dismissed the summons, observing that the Commissioners of Sewers could, if they pleased, take out a summons in their name.

RICHMOND (SURREY) WATER SUPPLY.—The Richmond Vestry have showed so much reticence in the information furnished to the ratepayers as to the real position and prospects of the present and future water supply to the town, that the report of Major Tulloch, who recently held a Local Government Board inquiry there, will be looked for with considerable interest. The main points on which the ratepayers appear to have an urgent claim to definite information are the analytical quality of the water derived from the present sources of temporary supply in the Petersham meadow, and the prospects of the new well from which the permanent supply of water is hoped for. With regard to the water sources in Petersham meadow, they were inspected by Major Tulloch, and the distance from the river, the porous nature of the soil through which the water flows, and the fact that the depth of the water in the meadow appeared to vary with the tide, were duly noted. In the course of the inquiry it was elicited that the new permanent well is now sunk to the depth of only 215 feet, scarcely more than half the total depth which the most sanguine anticipate will be necessary. Perhaps the most unsatisfactory of the admissions made by the vestry during the inquiry was that of the 215 feet, the present depth of the well, only 10 feet have been sunk during the last four months. Can it be possible that the Richmond Vestry have been recently under the impression that the permanent use of the tidal Thames water from the Petersham meadow would be sanctioned? If so, the sooner they are undeceived on this point the better it will be for the health and the pockets of the Richmond ratepayers. —*The Lancet.*

Miscellaneous News.

THE WARDEN OF THE STANDARDS ON GAS-METER TESTING.

The Eleventh Annual Report of the Warden of the Standards (Mr. T. H. Farrer) made to the Board of Trade, and laid before Parliament, has just been published. The fourth division relates to the duties of the department under the Sale of Gas Act, and is as follows:—

Gas-Measuring Models deposited at London, Edinburgh, and Dublin.

The models of the standard gas-measurers or gasholders sent in 1860 to the Lord Mayor of London, to the chief magistrates of Edinburgh and of Dublin respectively, in pursuance of sec. 3 of the Act 22 & 23 Vict., c. 66, have now been re-verified by comparing them *in situ* with proper standards sent for that purpose to each city, in charge of an officer of this department. The results of these comparisons were communicated to the authorities of these cities with a statement of the error of each model, and an expression of the satisfaction of this department at the state of the valuable models thus committed to their charge.

Use of these Models.

The Sale of Gas Act makes no provision for the use of these models, and it is a matter of regret that such instruments should have been sent to these cities without some instruction as to their probable use.

Condition of Gas-Meter Inspector's Working Standards.

During the visit of the officers of the department to the gas-meter inspector's offices at London, Edinburgh and Dublin, they had the opportunity of examining also the condition of the working standard gas-measurers used by the inspectors of these cities in the actual testing of gas-meters. It was found that in no case had these working standards been re-verified since their original verification in 1860. The condition of the working standards issued to other places is probably similar. After a period of 17 years the errors of these working instruments may now be considerable, and the accuracy of any results obtained from them is doubtful. The attention of this department has been called by inspectors of gas-meters and others to the omission in the Sale of Gas Act to provide for the verification of their gas-measuring standards.

Insufficient Testing of Gas-Meters.

An important question brought under the notice of this department is the question of testing the *index* of a gas-meter. At present the inspector of gas-meters is not required by law to examine into the accuracy of the index, and consequently gas-meters are stamped as correct although the inspector's examination is a partial one. Three recent instances have been reported to this department, in which consumers of gas were charged for gas much in excess of what they had consumed, owing, as it was subsequently accidentally discovered, to the inaccuracy of the index only. In one instance a "3-light" meter registered five times more than was really consumed; in a second instance a "300-light" meter registered three times more than was really consumed; and in a third instance, Mr. W. B. Davis, of Torquay, complains that his meter, although stamped as correct, had been found to register 86,000 feet in excess.

Deposit at Standards Office of Standard Gas-Burners.

In compliance with the provisions of the Commercial Gas Act, 1875, the South Metropolitan Gaslight and Coke Company's Act, 1876, and The Gaslight and Coke Company's Act, 1876, there has been deposited in this department a model of the gas-burner for testing *common* gas as prescribed by the said Acts. A model of the gas-burner for testing *cannel* gas is also to be deposited here.

LOCAL GOVERNMENT BOARD PROVISIONAL ORDERS.

The following circular has just been addressed to the sanitary authorities throughout the kingdom:—

"*Local Government Board, Whitehall, S.W.,*
"*Aug.* 22, 1877.

"Sir,—I am directed by the Local Government Board to state that the Chairman of Committees of the House of Lords has given notice that, on an early day next session, he will move that no Bill originating in that House to confirm Provisional Orders shall be read a first time after Tuesday, the 9th of April next; and that no such Bill brought from the House of Commons shall be read a second time after Tuesday, the 18th of June.

"It has been the practice of the House of Lords, in each session, to fix a day before which Bills of the kind referred to must have reached a prescribed stage; but the dates now proposed will render it necessary that Confirming Bills should be introduced much earlier than has hitherto been required; and the consequence will be that, should the motion be passed, it will be impossible that any large number of Provisional Orders can be confirmed next year, unless the applications are made much sooner than has hitherto been usually the case.

"It must be borne in mind that some time must necessarily elapse after the application has been received by the Board before the Provisional Order can be issued. It is in almost all cases requisite that a local inquiry should be held, in order that the requirements of the statute, under which the application is made, may be complied with; and as the Board now annually receive about one hundred applications for Provisional Orders, and the number of inspectors by whom the inquiries are held is very limited, a considerable time must elapse before the inquiries are completed, although every effort is made on the part of the Board to secure that in these cases the inquiries shall be held at the earliest dates practicable.

"Having regard to the foregoing considerations, the Board have deemed it desirable to fix a day before which all applications for Provisional Orders under the Public Health Act, 1875, or the Artizans and Labourers Dwellings Improvement Act, 1875, must be made, if it is desired that the Order should be confirmed during the ensuing session. They have accordingly determined that all such applications must be received not later than the 1st of January next, subject to this exception—viz., that where the application is for an Order to put in force the compulsory powers of the Lands Clauses Consolidation Acts, or to confirm an improvement scheme under the Artizans and Labourers Dwellings Improvement Act, and the advertisements were not published until November, the application may be received not later than the 1st of February.

"The Board, however, are desirous of drawing the special attention of the sanitary authority to the provision in section 176 of the Public Health Act, 1875, which enables sanitary authorities to issue, in the months of September and October, or of October and November, the advertisements and notices which are required before they can apply for a Provisional Order to enable them to obtain lands by compulsory purchase; and the Board direct me to state that it appears to them to be very desirable that the sanitary authority should avail themselves of this power, if they propose to make an application under the section in question. The same observation applies to applications under the Artizans and Labourers Dwellings Improvement Act.

"With a view of affording sanitary authorities information as to the requirements of the Board in connexion with applications for Provisional Orders under the Public Health Act, they have prepared some instructions on the subject, a copy of which is enclosed. Similar instructions have also been prepared with regard to applications under the Artizans and Labourers Dwellings Improvement Act, and these can be obtained on application to the Board, in cases where they are required.

"The Board trust that the sanitary authority will co-operate with them in this matter by forwarding, at as early a date as practicable, any application they may intend to make for a Provisional Order, and by following closely the rules laid down in the instructions, by which much time will be saved. (Signed) "JOHN LAMBERT, Secretary."

READING GAS COMPANY.

The Half-Yearly Meeting of Shareholders was held on Tuesday, the 28th ult., when the following report was presented and adopted:—

The directors beg leave to present to the shareholders the statements of account and balance-sheet for the half year ended June 30, 1877, and in so doing have again the pleasure to recommend that, on the 1st of September next, full dividends be paid on the various stocks and shares of the company, in accordance with the scheme set out in the dividend account.

Your directors are glad to be able to report that the business of the company has been conducted to their satisfaction. The per centage of loss of gas by condensation, waste, &c., is again unusually small, and Mr. Baker, the company's engineer, has been engaged during the summer in repairs of plant, inspection, and relaying of mains and services, which your directors do not doubt will still further reduce the per centage of loss.

Profit and Loss Account, June 30, 1877.

Dr.		*Cr.*	
Coals consumed	£5,545 17 11	Gas-rental	£10,728 13 9
Purifying materials	50 1 9	Coke	1,965 2 2
Meters	283 6 6	Tar and ammoniacal liquor	1,167 7 9
Fittings	209 3 9	Rents of tenements	10 9 7
Materials	839 8 4		
Contingency-fund	385 0 0		
Wages	2,214 1 1		
Salaries, &c.	737 15 9		
Tradesmen's bills	360 1 3		
Rates, taxes, &c.	541 1 9		
Interest	245 0 4		
Bad debts and allowances	40 11 9		
Miscellaneous	105 16 11		
Balance	2,314 6 2		
	£13,871 13 3		£13,871 13 3

Balance-Sheet.

Share capital paid up	£66,000 0 0	Cost of plant, &c.	£83,306 13 6
Mortgage debt	11,000 0 0	Amount due for—	
Premiums on shares	5,990 5 0	Light	4,280 5 5
Debts due to sundries, viz.—		Coke	1,074 11 4
Coal	175 1 10	Tar and ammoniacal liquor	829 8 7
Coke	24 0 0	Fittings	102 13 4
Purifying materials	7 19 7	Stock on hand—	
Meters	70 15 10	Tar and ammoniacal liquor	137 1 8
Fittings	503 5 2	Purifying materials	150 0 0
Wages	3 10 0	Coals	1,035 12 8
Materials	374 14 5	Coke	50 0 0
Tradesmen's bills	182 3 5	Meters	179 11 4
Rates, taxes, &c.	517 19 0	Fittings	195 0 0
Salaries, &c.	102 15 8	Materials	758 0 0
Miscellaneous	60 5 0	Office furniture	40 0 0
Contingency-fund balance	13 17 8	Petty cash in hand	120 0 0
Unclaimed dividends	79 1 0	Balance in banker's hands	2,654 9 10
Reserve-fund, £4500, and dividends accrued thereon invested in £5542 18s. 1d., New 3 per cent. stock.		Ditto dividend account	34 16 0
Balance brought from last account—dividend account £8528 3 11			
Less carried to reserve-fund 1000 0 0	7,528 3 11		
Profit and loss account	2,314 6 2		
	£94,948 3 8		£94,948 3 8

HARTLEPOOL GAS AND WATER COMPANY.

The Annual Meeting was held on the 30th ult.—Mr. T. R. HOLMES in the chair.

The report of the directors stated that, notwithstanding the reduction in the price of gas, the accounts bore favourable comparison with the previous year. A balance of £14,052 was available for dividend, and out of this the directors recommended a dividend of 8 per cent. per annum on the A shares, 7½ on the B shares, and 7 per cent. on the paid-up C capital of the company. The new works at Hurworth Burn had been completed, except in some minor details, which could not be finished until the new railway abutting thereon was further advanced. Further extension of the gas-works at West Hartlepool had become necessary, and a new condenser would be ready for work in the ensuing winter; but an additional gasholder, &c., must be completed without delay, to meet the necessary requirements of the district. Having regard to the outlay thereby involved, and to the fact that the capital and borrowing powers of the company were exhausted, the directors would have to apply to Parliament next session for powers to increase the capital of the company.

The accounts appended to the report showed that the profits derived from the gas department during the year amounted to £9530, and those from the water department to £4498. An additional profit of £256 had been realized from the sale of gas and water fittings, making a total of £14,284.

The CHAIRMAN moved the adoption of the report, and the declaration of the dividends recommended by the directors. He congratulated the shareholders upon the healthy condition of the affairs of the company, and the prospect before them of still further development.

Mr. FISHER seconded the motion, which was put and carried.

The other formal business having been disposed of,

Mr. FISHER proposed a resolution to the effect that the directors be empowered to take such steps as they may deem necessary for increasing the capital of the company by obtaining parliamentary powers for that purpose. This he did because the directors found it necessary to still further extend the gas-works at West Hartlepool. In the words of the report, "a new condenser would be completed and ready for work during the ensuing winter; but an additional gasholder, scrubber, and other gas plant must also be provided without delay, to meet the increasing requirements of the district." Hence the company required additional capital. They had outstripped their existing resources, and they asked for authority to raise more money. There was no question as to the absolute necessity for it. The report, which spoke for itself, showed a gradual increase in the consumption of both gas and water, and there was no doubt as to the importance of being prepared for future contingencies.

Mr. ROBINSON seconded the motion, which, after some conversation, was put and carried.

The proceedings closed with a vote of thanks to the chair.

DOVER GASLIGHT COMPANY.

The Half-Yearly Meeting of Shareholders was held on Tuesday, Sept. 4—Mr. W. R. Mowll in the chair.

The Secretary (Mr. G. Fielding) having read the notice convening the meeting, and the corporate seal having been affixed to the register, the following reports and accounts were submitted:—

We have now to inform you that on the 30th of June last Messrs. Anderson and Jones's term of office as your managers, which had existed under deed of arrangement for 21 years, terminated; and on the same day we entered into the actual management and control of the works, which were handed over by our late managers in a proper state of repair and efficiency; and we are gratified by the assurance that mutual feelings of respect, friendliness, and goodwill mark the severance of the connexion which has so long existed between us.

The business of the company is now being satisfactorily carried on by the newly appointed officers under the orders of the directors, upon the lines laid down in our last report to you.

We still are able to report a favourable increase in the private consumption of gas, which will enable us to declare the usual dividend for the past half year at the rate of 7½ per cent. per annum.

For the reasons stated in our last report, we do not intend to make any proposition upon the subject of the salaries of the directors or secretary at this meeting.

The 200 shares created at the last meeting were sold by auction on the 9th of August, and realized the average price of £15 3s. 5d. per £10 share.

Messrs. Mannering and Stone retire from office at the ensuing meeting, as directors, and Mr. C. K. Worsfold, as auditor, but all are eligible for re-election.

21, *Abingdon Street, Westminster, S.W., Aug.* 23, 1877.

To the Directors of the Dover Gaslight Company.

Gentlemen,—I beg to report that during the past half year the whole of the buildings and apparatus at your several stations have been maintained in good repair and efficient working order.

I am, gentlemen, your obedient servant,

T. N. Kirkham.

Dr. *Revenue Account, for the Half Year ending June* 30, 1877. *Cr.*

Anderson and Jones, for manufacture of gas, &c.	£5911	0 9	Discount, over-estimated last half year	£23	8 8
Lighting and cleaning lamps, &c.	210	7 6	Rental for half year	8231	15 1
Balance	3417	11 11	Public lamps	1283	16 5
	£9539	0 2		£9539	0 2

Profit and Loss Account.

Rates and taxes	£573	11 10	Balance of revenue account	£3417	11 11
Salaries	93	19 9			
Subscriptions	16	16 0			
Petty cash	15	6 9			
Sundry small payments	33	0 6			
Law expenses	41	17 6			
Rents	5	0 0			
Depreciation	358	7 10			
Debenture interest	247	6 4			
Balance	2032	5 5			
	£3417	11 11		£3417	11 11

Balance-Sheet.

Old capital converted into stock	£21,945	0 0	Amount expended on permanent works	£71,678	9 4
New shares, Act of 1860	18,055	0 0	Managers	3,417	11 11
Ditto, 1864	10,550	12 6	Amount expended on coals, &c., on account of next half year's consumption	734	18 1
Statutory mortgages	10,000	0 0	Bankers	617	9 9
Sundry liabilities	478	0 3			
Premium on new shares account	1,983	12 9			
Surplus profits	4,089	14 7			
Depreciation account	7,314	3 7			
Balance of profit and loss	2,032	5 5			
	£76,448	9 1		£76,448	9 1

The Chairman, in moving the adoption of the report, said the directors met the shareholders that day under circumstances of considerable satisfaction. They had had a period of some anxiety to pass through, and he was happy to say that they had so passed through that period that they were enabled to say that the promise they gave the shareholders in days that were past had been fulfilled, and the expectation they created had been realized. The agreement of Messrs. Anderson and Jones with the Dover Gas Company had terminated by efflux of time, and as the report stated they parted with mutual feelings of respect, friendliness, and good will, and to accomplish that was worth something. It was further his pleasure to communicate the fact that, owing to having had a prosperous half year, and owing to the fact that coals had not risen in price, the directors were able to declare a dividend of 7½ per cent. per annum. Up to this moment that dividend had been uncertain. The directors could never tell at the commencement of any half year whether it would be in their power to divide amongst the shareholders the 7½ per cent. allowed by their Act of Parliament. But now he thought he might say, as chairman of the company, so far as men could see into the future, and in view of the powers which their Act of Parliament gave them, that that dividend of 7½ per cent. was now assured to the shareholders, subject, of course, to any great advancement in science, or to any casualty which might involve the outlay of some thousands. Apart from these two contingencies, he had much pleasure in being able to state that the shareholders of the company might now consider that from half year to half year the 7½ per cent. dividend would be divided amongst them. It was also very gratifying to the directors to find that the company enjoyed so highly the confidence of their fellow-townsmen, as was evidenced by the circumstance that at the last sale the shares offered to the public realized a premium of upwards of 50 per cent. So much for the past. Now, as regarded the future, undoubtedly they had taken upon themselves a very grave responsibility. It was one thing to walk through the streets and to see them sufficiently lighted with gas, but the accomplishment of that end required an amount of surveillance which involved both anxiety and responsibility. The directors, however, thought they could point with confidence from now back to the 1st of July last, and say that the town had, at the very least, been as well supplied with gas as ever it was previously; and he thought he might say that, owing to some improvements which had been made recently in the extension of mains, since they took the works over into their own hands, and improvements made by Messrs. Anderson and Jones, the town now from end to end was enjoying an efficient supply of gas. The problem the directors had to solve was this—to supply good gas, and at as cheap a rate as it could be supplied, looking to the fact that the shareholders were entitled to their dividend; and, so far as they could judge, they had every reason to feel confident that they would accomplish this. Their interests now were identical with the interests of the local board. It was not so in Messrs. Anderson and Jones's time—no fault of theirs—but it was so now, and it should never be lost sight of that this company consisted of a large number of the inhabitants, who, seeing that the town required gas, willingly put their capital into the company with the view of supplying that want. He could not forget—the directors could not forget—that when the contract came up the other day for the supply of fuel to the water-works, the local board chose to select Welsh coal, and to pay for that coal a far higher price than they would have paid if they had had coke. He could not suppose that they were influenced by any but the best of motives; but he was bound to say that the mistake which they made was a most unfortunate one, and if he spoke of it in the language of a ratepayer, he should say it was an egregious blunder. Why, it was something like a man living at Newcastle, who, wanting to keep his machinery going, but having a prejudice against Newcastle coals, should send to Wales for coal; or like a man, who, living in Wales, and having a prejudice against the coals of the Principality, should send for Newcastle coals. This was no mere flourish of trumpets, for, as a matter of calculation, supposing the local board had received the company's tender for coke, the whole of the water which would be required for the supply of the town during the next 12 months would have been pumped for the town for £225 less than the ratepayers would now have to pay, under the contract just made for Welsh coal. The gas company did not suffer one atom by this, but the town suffered something more. Not only did it sacrifice £225, but a further sum of about £125, because the rejection of the tender rendered it necessary for the company to send coke into a district already sufficiently supplied, and hence having to outbid the people in that district. So that, really and truly, the loss to the town by the acceptance of Welsh coal instead of coke amounted to the enormous sum of £350. Now this, by some, might be considered as a trivial matter, but when he recollected that this company stood in the first rank of large ratepayers, when he considered also that many of the shareholders stood in the position of large ratepayers, he said that they had some ground of complaint that so extravagant a method was adopted of carrying on the public work. Let him add that though there was this loss to the town of £350, there would not be a farthing lost to shareholders. In the time of Messrs. Anderson and Jones it would have been a loss, and this perhaps better exhibited to them the altered position of things. If, during the time Messrs. Anderson and Jones had the lease, the local board refused to burn coke at the water-works, the contractors would have had to send that coke somewhere else at a loss. But how did the case stand now? The company were entitled, under their Act of Parliament, to 7½ per cent. If all the facilities which the neighbourhood could afford them were given them for the purpose of carrying on their business, they could supply the town with gas at a much lower rate than if they did not have those facilities. The £350 would represent upwards of 1d. per 1000 feet—about 1½d.—in the total quantity of gas made in Dover. Inasmuch as they hoped to be able to reduce the price of gas presently, if that day they had been in a position to know that the water-works were consuming their 1000 tons of coke, and would pay the price they asked, they would have been enabled to say to the shareholders that they had, at all events, got 1d. profit towards the amount of profit they expected to make, so as to reduce the price of gas. But as that was not so, they would have to wait till the next half year closed, and if their balance-sheet would allow them to reduce the price of gas, well and good; if not, it could not be done. He hoped he had made the point clear to his fellow-townsmen. He was very anxious that it should so appear. There was another matter in the report. The question of the remuneration of the directors. They had not voted themselves a salary under the conviction that they had not earned one, because they felt they had had long and anxious meetings, and that a great deal of thought had been requisite. Their reason was that they did not intend that their salary should ever trench on the 7½ per cent. the shareholders were to receive. They did not intend that any salary they might receive should interfere with the dividend, and he thought he was justified in saying that if a winter of adversity should blow over them, the directors, sooner than the shareholders should have less, would waive receiving any remuneration.

Mr. Bottle seconded the motion, which was carried.

Mr. Jones, on behalf of himself and Mr. Anderson, thanked the directors for the kindly expression referring to them in their report.

The retiring directors and auditor were re-elected, and, on the motion of Mr. Jones, seconded by Mr. Grant, a sum of £300, surplus profit, was voted to the directors.

SUNDERLAND GAS COMPANY.

The Annual Meeting was held on the 5th inst.—Mr. E. C. Robson in the chair.

The directors report was as follows:—

An interim dividend was paid in March last, and your directors now recommend the declaration of a further dividend of 5 per cent. on the original stock, and 4½ per cent. on the additional capital stock of the company, payable on the 15th day of September. They also recommend the payment at the same time of 5s. per share on the original stock of the company, on account of the deficiency in the dividends of previous years.

The extensions at Hendon, alluded to in last year's report, are in a state of considerable forwardness, and will be ready to be brought into operation early in the ensuing winter.

The Chairman, in moving the adoption of the report, said there was very little in the report calling for any remark. There was a diminution in the gas and meter rentals of £100, but this was not from any decrease in consumption. There had been an increase in consumption, and the cause of the falling off was owing to their having reduced the price of the gas to the extent of 3d. per 1000 cubic feet. This represented about £3000 remitted to the public. That was the third year they had reduced the price of the gas. They would carry forward the sum of £4525. As to the expenses, there had been a little more paid for wages than last year, but the sum paid for coals was considerably less, though the quantity carbonized had been greater. The total amount of gas delivered to the public was 322 million cubic feet, or an increase of about 20 millions on the previous year. Referring to the question of the adoption of the electric light, he said it had been used at the Magasin du Louvre in Paris, but the difficulties in the way of bringing it into general use were insuperable. He believed that in gas the public had a light which could be controlled and directed in a manner suitable to their requirements, and that was not so with the electric light. As to the new works at Hendon, he said that the new shares, issued to the extent of £5000, had realized £9000. The necessary buildings were being erected, and they hoped that before winter they could make use of these works. The necessity for such works would be seen in the large increase they had made annually in the amount of gas consumed for some years past.

The report having been adopted,

Dr. Yeld moved the declaration of the dividend recommended by the directors.

Mr. G. Matthew, jun., seconded the motion. He said that strangers were often led to believe, in reading the reports, that the company were paying twice 5 per cent. on the money invested. This interest was paid only on the value of the shares, and not on the sum invested.

Alderman Alcock said the majority of the shares had cost the purchasers more than £5 per share. A large proportion had cost them between £8 and £9 per share. He thought it should be stated that the interest was paid on the nominal capital of the company.

The resolution was agreed to, and Messrs. James Hills, James Stokoe, Henry Taylor, and James Laing were re-elected directors.

The meeting terminated after passing votes of thanks to the chairman and directors.

Canterbury Gas and Water Company.—The half-yearly meeting was held on the 31st ult.—the Mayor presiding. The profit on the half year's working was reported to be £2800, and a dividend at the rate of 8 per cent. per annum for the half year was declared.

LEICESTER GAS COMPANY.

The Half-Yearly Meeting was held on the 3rd inst.—Mr. W. E. HUTCHINSON in the chair.

The SECRETARY (Mr. Billson) read the following report:—

The directors present herewith to the shareholders the half-yearly statement of the accounts of the company for the half year ending the 30th of June last.

They have pleasure in reporting that notwithstanding the reduction on the 1st of January last of 2d. per 1000 cubic feet in the price of gas, the gas and meter rental for the half year shows an increase over the corresponding half year of 1876 of £1755 3s. 10d. The balance to credit of revenue is £14552 18s. 5d., which being added to the amount brought forward for the past half year, gives £20,151 15s. 5d. now to be dealt with, and the directors recommend that dividends be declared, free of income-tax, of 11s. 6d. per share on each A share, 7s. 6d. per share on each B share, and 7s. per share on each C share.

The results of the half year's working have been most satisfactory.

The company's new Act of Parliament received the Royal Assent on the 2nd of August last. The proprietors having agreed with the Corporation of Leicester for the transfer of the undertaking to that body on terms mutually agreed to, it is not probable that the powers given by that Act for increasing the share capital of the company will be exercised. Application will be made to Parliament in the next session for an Act to carry into effect the terms of the agreement with the corporation.

The urgent necessity for a large increase in the respect of manufacturing and storing gas will receive the anxious consideration of the directors.

The directors who retire by rotation are Messrs. Hutchinson, Clephan, and Kempson. They are eligible for re-election, and offer themselves accordingly.

The CHAIRMAN moved—"That the report of the directors now read, and the recommendations contained therein, and also the statement of accounts presented for the half year ending on the 30th of June last, be respectively received and adopted, and that the same be printed, and a copy sent to each proprietor." In doing so, he said it was very gratifying to the directors to meet the shareholders on that occasion, especially as they had the opportunity of presenting to them so very favourable a statement of the accounts of the company, that notwithstanding they had reduced the price of gas 2d. per 1000 feet on the 1st of January last, the rental of the company had exceeded that of the corresponding period of last year by a little over £1700. This arose chiefly from two causes—one was the very large increase in the consumption of gas, and the second was that they had obtained their coals at a lower price than they were able to do during the corresponding period of last year. They were consequently enabled to declare the usual dividends, and besides to carry over a very handsome balance. The accounts, which they had just heard read, showed that the share capital of the company was all paid up—£220,000. The loan capital was now available as they might require it, to the full extent authorized by the Act of Parliament—namely, £55,000. They had expended on the capital account during the past year £5112. The items were—new buildings, manufacturing plant, and so on, £1388; new mains and service-pipes, including the laying of the same and paving, £1635. These had been rendered necessary by the very large increase in the demand for gas. The new meters had cost them £1366, and these were also rendered necessary by the large increase in the number of consumers. The parliamentary expenses to the 20th of June had been £722. This was rather an unusual item with them, but, as they were aware, they had to prepare for Parliament, and for a very vigorous opposition to their Bill, and the cost of obtaining that Bill, as far as had yet been ascertained, was £722. They had a balance on the 30th of June of nearly £10,000, so that, with the £55,000 of borrowing powers, they had the sum of £65,000 available for capital expenditure. The report alluded to the necessity which existed for increasing the capacity of manufacturing and of storing gas. He had told them, on a former occasion, that the directors delayed as long as they could applying to Parliament for further capital; but the demands made upon them were so great that it was only exercising ordinary prudence to be in a position to satisfy the demands which they expected in the course of the next year. The directors had had returns made to them which showed that in round numbers they increased 10 per cent. every year in their make, so that they had now reached very nearly the capacity of the works for producing and storing the gas which was made during the year 1876; consequently, they had had to look ahead, and to exercise some of the powers conferred upon them by the Act, which the report stated received the Royal Assent on the 2nd of August last. They were just now crowded out, and they had no room for additional gasholders at the present works, and they saw no other alternative than to exercise the powers of the Act of Parliament, and to commence, in the course of this autumn, a new gasholder and all the necessary accompaniments, and to continue the main from Infirmary Square, or somewhere thereabouts, to the land which was scheduled in the Act of Parliament. The revenue account showed that they had expended during last half year a considerable amount in repairs, which they had made to the purifiers, to the gasholders, and other parts of the works, and this was properly charged to the revenue account. The directors were, as the report stated, well satisfied with the result of the half year's working, and he hoped that the shareholders would also be satisfied.

Mr. FRISBY seconded the motion, which was put and carried, and the dividends recommended in the report were declared.

Mr. W. GRAY proposed the re-election of Messrs. Hutchinson, Kempson, and Clephan as directors. He said he was glad that those gentlemen were able and willing to continue to give their valuable experience to the service of the company. He trusted that so long as the shareholders had an opportunity of recording their thanks to the directors, they would be willing to do so. He only regretted that there was a possibility of the time soon coming when the present directors would cease to be at the head of the affairs of the company.

Mr. T. HOLYLAND seconded the motion, which was carried.

The CHAIRMAN remarked that, for himself and colleagues, he begged to thank the shareholders for this unanimous expression of their opinion of their services, and for having done them the honour of requesting them to continue to be directors of the company. He could assure them that it was a great pleasure to them to bestow their time and attention to the interests of the company. It had been rather a favourite concern of his own, as he had been connected with it for some 45 years. He had watched over it with great interest, and he had given a large amount of time and service to the company. He was, as Mr. Gray had expressed it, rather sorry that their continuance as directors was limited to so short a period. They would, he believed, expire this time next year. However, the concern would be handed over to the town council in a very prosperous condition, and he believed that they would have no cause to regret the purchase which they had made, and the terms which they had given.

Mr. M'CALL proposed a vote of thanks to the chairman for presiding, which was seconded and carried.

The CHAIRMAN briefly replied, and the meeting terminated.

NEWPORT (MON.) WATER COMPANY.—The half-yearly meeting was held on the 27th ult.—Mr. S. Homfray in the chair. The report of the directors recommended that the guaranteed interest for the half year ending the 31st of December on the preference shares be paid, that a dividend of 4 per cent. for the same period upon the ordinary share capital called up be declared, and that such interest and dividend be payable on the 10th inst. This will leave a balance of £1473 14s. 5d. to the credit of the general revenue account.

RICHMOND (SURREY) GAS COMPANY.

The Half-Yearly Meeting of Shareholders was held on Thursday, Aug. 30—Mr. F. CHAPMAN in the chair.

The SECRETARY (Mr. E. B. Blott) read the half-yearly statement of accounts, the principal items in which were as follows:—Manufacture of gas, £6135 5s. 11d.; distribution, £334 6s. 4d.; management, £639 14s.; and some other items, making with the balance of £2828 2s. 2d., a total expenditure of £10,422 15s. The total gas and meter rents amounted to £8742 15s. 6d., and the residual products to £1589 15s. 10d.

The CHAIRMAN said as this was only an interim meeting, they did not, as a rule, go into much business, or print the accounts, but they had met for the very pleasant purpose of saying what dividend should be given to the shareholders. From the balance they had in hand the directors felt quite justified in offering a dividend of 10 per cent. on the old, and 7 per cent. on the new shares. As the shareholders were aware, the new rate of charge had come into operation, and thus the directors had carried out the conditional promise made at the last meeting. There was very little more to say, except to congratulate the shareholders upon the improved position of their property. The new holder was getting on, and would be ready for work by the time the long dark nights, with the increased consumption of gas, set in, while West's stoker was doing its work quite as well as was expected. The engineer of the company (Mr. Eldridge) had kept the works in such good order and efficiency that the directors had no hesitation in stating that they would bear favourable comparison with any existing works in the kingdom. During the last half year, timid people had been a little frightened by the scare about the electric light, but he advised them to stick to their shares, and not to be frightened about that. He might mention that, now they had reduced the price of the gas, the shareholders would be entitled, if the company went on as at present, and could earn it, to an additional 1 per cent. on the present 7 per cent. shares.

On the motion of Mr. SMITH, a dividend of 10 per cent. on the old, and 7 per cent. on the new shares was then declared, and the statement of accounts was approved and adopted.

Mr. G. F. WHITELEY then proposed, and Mr. HILLIER seconded, a vote of thanks to the chairman and directors, and this having been duly carried and acknowledged, a similar compliment was paid to Mr. Eldridge, the engineer, and the meeting then terminated.

DERBY WATER-WORKS COMPANY.

The Half-Yearly Meeting was held on the 30th ult.—Mr. GASCOYNE in the chair.

The report presented was as follows:—

The directors of the Derby Water-Works Company desire to submit to the shareholders the accompanying statement of accounts for the half year ending June 30, 1877.

The gross receipts from revenue amount to £6282 5s. 3d., as compared with £6171 11s. 2d. in the previous half year, or with £5813 0s. 1d. in the corresponding one, being an increase of £289 19s. 8d. above the average receipts in those half years. The revenue expenditure is £3720 0s. 9d., as compared with £3417 13s. 4d. in the previous, or with £3113 12s. in the corresponding half year, being an increase of £454 8s. 1d. above the average expenditure in those half years, and is unusually augmented, partly by a serious accident to the new engines, and partly by an outlay for renewing and deepening the strata in the old filter reservoirs. The net realized profit is £2562 4s. 6d. available for dividend. The reserve-fund amounts to £1999 6s. 7d., and the directors recommend the appropriation of £1782 15s. 6d. of this towards dividend, which will enable a payment to be made of 8 per cent. on the original shares, and 7 per cent. on the new, leaving a reserve-fund of £216 11s. 1d.

The duties of the management having become too heavy and continuous for the unassisted labours of the board, the services of a resident engineer (Mr. E. K. Burstal) have been engaged; this gentleman, specially recommended by Messrs. Hawksley, has now commenced his duties, and it is hoped that his appointment will be found beneficial to the company's interests.

It is with unfeigned satisfaction the directors can now report that the main details of the new undertaking have been completed, and that little is wanting, except as to drains, fences, &c., to render the extensive works at Little Eaton complete. The town and outside districts are well supplied with water both in quantity and quality, the contractors have all been finally paid, and it now specially remains for us to watch over our financial interests with strict and continuous care, and the shareholders may rely on the maintenance of their valuable property on a footing with which they will doubtless be fully satisfied.

The directors are sorry to report the resignation since the last general meeting of their deputy-chairman, Mr. Henry Evans, whose place on the board has been filled by the election of the Hon. W. M. Jervis.

The CHAIRMAN, in moving the adoption of the report, said that this was the eighteenth ordinary meeting since the Act was passed enabling them to raise further capital on behalf of their new undertaking, and this was the first occasion on which it had fallen to his lot to become an apologist for any kind of deficiency. But the real deficiency at that moment was small, being occasioned by the rapid outlay, during the last nine years, of capital upon unproductive works, and they had had to wait through the whole period of their development until its close before a single shilling could be derived from the outlay. Districts which had never before had the company's water were now supplied through this new undertaking, separate mains, reservoirs, and plant having been provided, and as the capital thus expended could not be supposed to contribute to revenue, the company had necessarily to wait until some results were produced. But was it not astonishing that a company, who had only expended a capital of £60,000 when they applied for powers to extend their works, and whose expenditure now amounted to £177,000—during the interval £117,000 had been spent—should have been able, while this capital was unproductive, to have paid a dividend of 10 per cent. on the original shares, and of 7 per cent. on the others? He did not think, therefore, that any complaint could be made of neglect or want of energy on the part of the directors, for the facts he had detailed spoke for themselves. The deficiency he had mentioned was but small, and he had to ask for a deduction of 2 per cent. on the original shares. The deduction was confined to that class of shares in accordance with the law, and if it had been distributed over the whole of the shares it would have been very small indeed. But this deduction, after exhausting the strict reserve-fund, would leave a balance of £217. The deductions only amounted to £400, while the dividends reached the sum of £4800. In accounting for the deficiency, he said the directors had had an uphill battle to fight from the moment when, by the opposition which was raised to their application to Parliament, they lost nearly £20,000. The expenditure during the progress of the works was £117,000, and it entailed upon the company £5600 a year in additional dividends. He expressed himself hopefully for the future, and said the shareholders were not doomed to absolute despair, for they had a suspense-fund of upwards of £3000, which the directors had on this occasion determined to leave in its entirety, and there were several other sources which would be available in the event of future deficiency, one of which he reverted to last year, but which he hoped would not have to be taken advantage of—he alluded to a rise in the price of water.

Mr. HUISH seconded the adoption of the report, which was agreed to.

A dividend of 8 per cent. upon the original shares, and of 7 per cent. upon the new shares, was agreed upon, and a vote of thanks to the chairman, directors, and other officers was then passed.

SOUTH STAFFORDSHIRE WATER-WORKS COMPANY.

The Half-Yearly Meeting of Shareholders was held in Birmingham, on Thursday, the 30th ult.—Mr. F. James in the chair.

The following report of the directors was submitted:—

The statement of accounts for the half year ending June 30, 1877, shows that the balance remaining, after providing for interest on loans and preference shares is £12,520 14s. 5d., and your directors recommend the declaration of a dividend on the ordinary share capital for the half year at the rate of 6 per cent. per annum, less income-tax; the warrants for the payment of the same to be issued on Saturday, Sept. 1, 1877. The amount of this dividend will be £6553 17s. 9d., and there will remain £5966 16s. 8d. of undivided profits to the credit of future half years.

The quantity of water used by meter for trade purposes has been less than in the previous half year, and the revenue from that source has fallen off. This is doubtless a temporary reduction only, and is due to the prevailing depression in business throughout the district. It is satisfactory to note that the number of supplies both for trade use and for domestic consumption has increased. The number of houses supplied is now 28,469.

The new works are progressing steadily, and they bid fair to answer in all respects the expectations of your directors.

Dr. *Profit and Loss Account.* *Cr.*

Engine charges	£2,535	1	9	Balance brought forward, Dec. 31, 1876	£12,678	5 9
Maintenance of works	1,235	7	7	Deduct amount of 31st dividend, declared Feb. 22, 1877	5,619	1 0
Wages, turncocks, &c.	586	9	8		£7,059	4 9
Directors attendance fees	375	0	0	Half year's water-rates	20,938	13 10
Salaries—secretary, engineer, and clerks	930	9	6	Service laying	274	14 8
Collectors commission	651	9	4	Transfer from deposit account	419	16 8
Rents	500	1	5	Transfer from interest	4	0 9
Rates	867	3	1			
Income-tax	166	0	11			
Incidental expenses	227	10	7			
Current law charges	228	0	2			
Discount to landlords	361	3	2			
Allowances	426	8	8			
Bad debts	3	19	10			
Interest on loans	2,261	9	7			
Interest on permanent debenture stock	530	12	0			
Interest on preference shares	4,289	9	0			
Balance	12,520	14	5			
	£28,696	10	8		£28,696	10 8

The capital account showed that during the past six months £66,923 3s. 11d. had been expended, making the total cost of works to date £574,534 7s. 7d.

The Chairman, in moving the adoption of the report, said it would be seen from the accounts that the directors were spending a considerable amount of money on capital account. On the profit and loss account there was a slight diminution of charges and a slight increase in the maintenance of the works, which must ever vary. There was an increase in the rates, which was attributable to an increased assessment of property. The debenture stock, which figured in the accounts at £19,000, now stood at £34,000. Although the meeting last year gave the directors power to convert the ordinary debentures into debenture stock, it was very satisfactory to find that since that time, except for money which had been agreed to be taken before that resolution was passed, not a farthing had been taken upon debenture which come home again. That, in course of time, would considerably reduce their expenses in borrowing money. Less water had been used for trade purposes during the last half year, but when they considered what had been the trade of the district for the past long time, it was scarcely to be wondered at that there should be a diminution on that head. In the domestic supply there was a slight increase, and as there were 60 additional supplies for trade purposes, that would show that the diminution was simply a temporary one. During the last two years they had spent in new and, as yet, unproductive works upwards of £150,000, and the entire charge of that new capital in interest or dividend had been paid out of the revenue of the company, and if they had not been wise enough to lay by when they could some money for the purpose of equalizing dividends, it would have been impossible that they could then have declared a dividend of 6 per cent. when the interest of the unremunerative capital had been so large an item. Whether they should maintain the dividend at that rate was a question not without anxiety on their part, but it was not coupled with fear. He dared say they would have seen in the papers lately that their *laches* had been frequently brought before the public, and especially in the case of Lower Gornal. Last half year they expended £1000 in the laying of pipes in that district, but not one single connexion had been laid on, in consequence of the local board requiring that which they had no right to, in reference to the placing of the taps, and which the directors had no right to surrender. He had personally the highest respect for clergymen, but he thought that even clergymen stepped out of their way to denounce a public company from their pulpit or altar. They ought, at any rate, to have taken some means to ascertain the truth of their statements. According to a report in a local paper, the vicar of Lower Gornal (Mr. Rooker) had thought proper to denounce from his pulpit the South Staffordshire Water-Works Company before not an ordinary congregation, where some listened and others slept, but before a congregation of persons who came to receive charity. The reverend gentleman said he looked upon the pulpit as far too sacred a place to notice matters political, personal, or secular, and yet he went on to deplore the fact that the South Staffordshire Water-Works Company should neglect to supply the desired water. The fact was that a year ago the company spent a considerable sum in paying for pipes, but the local board wanted the power of fixing the taps. The directors were willing to consider every case on its own merits, but they would never concede to the local board what they desired in this respect. Twelve months ago a deputation from the local board in question waited upon the directors, and the whole question was gone into. An agreement was entered into, and the deputation were perfectly satisfied, but the local board refused to confirm what the deputation had agreed to.

The motion for the adoption of the report was seconded by Mr. J. N. Browne, and carried.

In reply to Mr. Cheshire, the Chairman said that the new works of the company were progressing satisfactorily.

A dividend of 5 per cent. on the preference shares, of 4 per cent. on the Dudley shares, and 6 per cent. on the ordinary shares, was declared, and the meeting concluded with votes of thanks to the chairman, directors, and officers of the company.

West Surrey Water Company.—The half-yearly meeting was held at the offices, Cannon Street, London, on the 30th ult.—Mr. J. M'Millan in the chair. The report stated that the revenue of the company was making rapid steps. For the year ended June 30, 1875, it was £368; June 30, 1876, £664; June 30, 1877, £1068; and at the present time the collection was upon a water-rental of over £1300 per annum. The mains had been extended to the town of Chertsey, and the directors anticipated a large additional revenue would arise therefrom. The report and accounts were adopted. The meeting was then made special, when resolutions were passed creating the additional capital of £25,000, authorized by the West Surrey Water Act, 1877, and the issue of the same either as ordinary or preference shares, in terms of the Act, and also authorizing the borrowing of £6250 upon mortgage, in respect of such additional capital.

WREXHAM WATER-WORKS COMPANY.

The Ordinary General Meeting of Shareholders was held on Wednesday, Aug. 22.—Mr. W. Overton in the chair.

The Secretary (Mr. F. Storr) having read the notice of meeting, the following report was presented:—

The expenditure on capital account for the past year amounts to £14,163 10s. 1d. The chief items are those in connexion with the construction of the new storeage reservoir at Cae Llwyd, the purchase of the land required in laying the main-pipes to the new works, and in extending the company's service into the new districts.

In order to meet these payments the directors have raised the necessary capital as authorised at the last meeting of the proprietors. Loans on mortgage have been secured to the amount of £2300, and 1300 "A" 5 per cent. preference shares were offered *pro ratâ* to the proprietors in March last, the whole of which were readily taken up.

The water account for the year shows, as compared with last year, an increase of £399 12s. 3d.

The total receipts for the year for water and profit upon fittings amount to £2846 10s. 10d. After payment of the usual charges, the interim dividend at 6½ per cent., the preferential dividend at 5 per cent. per annum for the half year ending December, 1876, and interest upon the mortgage debt for the year ended June 30, 1877, a balance remains on net revenue account of £1266 8s. 3d.

The directors, therefore, have pleasure in recommending the declaration of the second half year's dividend at the rate of 6½ per cent. per annum (free of income-tax) upon the consolidated stock and ordinary shares, and at the rate of 5 per cent. upon the preference shares, leaving a balance, £395 1s. 5d., out of which the directors propose to carry £250 to the reserve-fund, leaving £145 1s. 5d. to be carried forward to the next account.

During the year water has been laid on to 234 dwelling-houses, making a total of 2397 now supplied.

The districts of Gresford, Marford, Rossett, and Lavister have now been brought within the scope of the company's operations, the main-pipes, &c., to serve those places having been laid to Pulford.

Arrangements have been made, and an agreement concluded, with his Grace the Duke of Westminster to supply the estate at Pulford. The work of fitting up the various houses and farms is now completed, and a supply of water laid on.

During the past twelve months various building sites have been opened out within the district, and to meet the urgent public requirements the mains have been laid in new streets in the Hirdir, Hightown South, and Rhosddu. Building operations are being rapidly carried on, and from these places applications are constantly received for new supplies.

The construction of the reservoir at Cae Llwyd has been a source of much anxiety to the directors. In the prosecution of the works it was found that a fault occurred in the strata, which necessitated considerable deviation from the original plans. The death of the contractor, Mr. Ward, added also to the difficulties of the situation, and contributed to delay the progress of the works. The sureties have now the work in hand, and from the opinion expressed by the engineers, the directors believe that the works will soon be completed.

Appended to the report of the directors was the following report by Messrs. V. Wyatt and G. Thomas, the engineers:—

To the Directors of the Wrexham Water-Works Company.

Gentlemen,—We have to inform you that the deep puddle trench in the embankment of the Cae Llwyd reservoir, after considerable difficulty, has been bottomed to the clay throughout its entire length, and the clay puddle is being filled in. The death of the contractor, the very wet season, and the increased amount of work have delayed the completion of the contract hitherto, and increased the expense considerably. Now, however, that the great difficulty has been surmounted, we anticipate that the reservoir will be completed by October next, so as to receive a storeage of water.

(Signed) V. Wyatt, Geo. Thomas, } Engineers.

July 31, 1877.

The Chairman, in moving the adoption of the report, said the observations he had to make were of much the same character as he had made on former occasions. He had to remind the shareholders of the continued progress of the works and the prosperity of the company. Two things would most likely engage their attention—the amount expended on the capital account and the large increase in the revenue. On the capital account a large portion had been laid out in the construction of the new reservoir, which, in consequence of the death of the contractor, and by having to carry the puddle trench very much deeper than was anticipated, not only caused considerable delay but increased the outlay. The reservoir would shortly be completed, and the company would then possess a storeage of 40 to 50 million gallons of water to serve the ever increasing wants of the district, and sufficient for a population of some 25,000 persons. When they had consummated this they would cease to have the present auxiliary supply from another company. The revenue showed the largest increase—nearly £400—made in any year since the company were formed, and it was worthy of observation that that did not represent a like income of an entire year, as much of the property had only become chargeable during the past two quarters. The amount per house showed an increase on former years, proving that a better class of houses was taking a supply of water from the company. The working expenses showed an increase, but this was chiefly through their present system of purchasing water; even with this drawback, however, the cost would compare favourably with other companies, being under 30 per cent. Various extensions had engaged the serious attention of the directors and their manager, and he was happy to say that in these services of supply they were working in harmony with the local and sanitary authorities, in order to keep within the requirements of the Public Health Act. At the same time, in all these cases they had kept steadily in view the interests of the shareholders. Looking at the number of houses now supplied, as mentioned in the report, and the constantly increasing number, the thought had struck him, as no doubt it had many of the shareholders, how it was that the parties taking water from the company were supplied before the company began their supply ten years ago. In conclusion, the chairman said he thought the directors had every reason to congratulate the shareholders on the company's success.

Mr. Clark seconded the motion, which was carried unanimously.

The dividends recommended in the report were declared, and the retiring directors and auditor re-elected. The sum of £100 was voted to the directors for their services in the past year, and it was stated that they had held 22 meetings during that period, with 109 attendances.

Thanks were voted to the chairman, and the proceedings terminated.

Longton Gas Company.—The half-yearly meeting was held on the 31st ult., when the following report was presented and adopted:—"Your directors recommend that the usual dividends of 10 per cent. per annum on the original, and 7 per cent. per annum on all classes of the ordinary 7 per cent. shares, all free of income-tax, be declared, and paid at the half-yearly general meeting. Including the balance of £1053 5s. 4d. brought forward from the December account, the profit and loss (net revenue) account shows an amount of £2824 15s. 10d. available for division. The dividend will take up £1700, leaving £1124 15s. 10d. to be carried forward. The examination of the company's mains, and the testing and repairing of meters has been continued during the past half year. This special work will be finished during the current half year, and for the half year ending the 30th of June the leakage account shows an appreciable reduction. The works and general plant of the company have been maintained in a state of efficiency. The Longton Corporation Gas Purchase Bill received the Royal Assent on the 11th of June last, and the corporation are in negotiation for a loan to complete the purchase. The transfer is expected to take place about Christmas next."

DUBLIN CORPORATION AND THE GAS COMPANY.

At the Monthly Meeting of the Dublin Corporation on Tuesday, the 4th inst.—the HIGH SHERIFF presiding—the following letter from the Alliance and Consumers Gas Company was read, and ordered to be entered on the minutes:—

"*Alliance and Consumers Gas Company,*
"114, *Grafton Street, Dublin, Aug.* 30, 1877.

"Sir,—My directors had under consideration your letter of the 7th inst., enclosing a letter from Mr. Clemenshaw, with the copy of a resolution adopted by the municipal council thereon; and in reply I am to state that although my directors fail to see upon what principle they should be called upon to place before the shareholders a request to pay a debt incurred by the corporation by the employment of the engineers referred to, nevertheless, in deference to the wishes of the council, they will do so at the next half-yearly meeting, which will take place on Saturday, the 29th prox.

"My directors conceive it to be their duty to dissent from the implication contained in the resolution, and the statements made at the meeting of the corporation, that the present position of the company is in a great measure due to information received from those gentlemen, the fact being that they neither looked for nor received any information from them, although if they required any engineering advice it is more than probable they would apply to them. (Signed) "W. F. COTTON.

"Wm. J. Henry, Esq., Town-Clerk, Corporation of Dublin."

FATAL ACCIDENT AT THE REGENT ROAD GAS-WORKS, SALFORD.

On Monday afternoon, the 3rd of September, an alarming accident happened at the Regent Road Station of the Salford Corporation Gas-Works, which, though fortunately not accompanied by the destruction of much property, resulted in serious, and in one instance fatal, injury to persons employed at the spot. From the best information we have been able to obtain, it would appear that a leakage in one of the pipes in the exhauster-house was discovered early in the day, and five of the workmen were directed to examine the pipe and remedy the defect. Their names were John Butterworth, foreman; William Bate, blacksmith's striker, residing at Eccles; Henry Hooper, watchman; Henry Jones, engineer; and John Kendall. While engaged in repairing the leakage, shortly before one o'clock in the afternoon, suddenly, and without the slightest warning, an explosion of gas occurred, blowing the roof off and completely demolishing the windows and frames of the exhauster-house. The men were buried in the *débris*, and all were injured. Bate was shockingly mutilated, and Mr. O'Loughlin, assistant to Dr. Cran, who was in attendance in a few minutes after the accident, expressed an opinion that he could not recover. The unfortunate man was at once conveyed in a cab to the Royal Dispensary, and died there shortly before three o'clock the same day. Butterworth, with assistance, walked to his own home, which was within a short distance; but by the advice of Mr. O'Loughlin, Hooper, Jones, and Kendall were removed to the dispensary, where they were attended by Mr. Ross, the house surgeon.

The report of the explosion was heard at a considerable distance, and the fire-engine stations were communicated with, so that the brigade might be in readiness in case of fire, but fortunately their services were not required.

Butterworth, the foreman, under whose direction the work at the valve was being carried out, is a most experienced, careful, energetic, and painstaking man—in fact, the most experienced man in the employ of this department of the Corporation. It would seem that at noon on the day of the accident the syphon was full, but a heavy pressure of gas from the purifiers (which are very small, and are now being replaced by larger) emptied it, and at 12.30 Butterworth was in the act of refilling it. Probably, in the excitement of the moment, he forgot to turn out, or did not notice, a naked light burning close to him, which caused the escaping gas to ignite. The manager of the works—Mr. S. Hunter—who is just recovering from a serious illness, was absent at Southport at the time, but being immediately telegraphed for, he was on the spot about two hours after the accident. The damage to property is fortunately very small; the building in which the accident occurred was old, and had been condemned to be pulled down as soon as new and larger premises were erected. There was no interference with the supply of gas to the town. We are happy to learn that at the latest moment the injured men are doing well.

On Tuesday, the 4th inst., an inquest on the body of the unfortunate man William Bate was held by Mr. F. Price, the district coroner, at the Borough Police Court, Salford, when the following evidence was given:—

Mr. *W. A. Ross*, acting house surgeon at the Salford Royal Hospital, stated that the deceased was brought to the institution about one o'clock on the previous afternoon. He was suffering from a compound fracture of the skull and dislocation of the neck, and died about an hour and a half after being received into the hospital.

Thomas Henry Frost said he was a blacksmith in the service of the Salford Corporation at the Regent Road Gas-Works. At midday on Monday he went home to dinner, leaving the deceased in the smith's shop at the works. His (the witness's) residence was in Doddington Street, Regent Road, and while he was there he heard the report of the explosion at the gas-works. He immediately returned to the works, and found the deceased lying in an unconscious state on the floor of the smith's shop. Blood was flowing from his nose and mouth, and two bars of iron, each 1¼ inch in diameter, and weighing about half a hundred-weight, were lying across him, one being on his hip and the other on his neck. The explosion had taken place in an adjoining house, where there was an exhauster, and also a steam-engine, and it had evidently caused the iron bars to fall upon the deceased by violently shaking the wall against which they had been leaning, and which divided the exhauster-house from the smith's shop. The witness called for assistance, and the deceased was removed.

Benjamin Smith, a boiler maker in the service of Messrs. Piggott and Co., Spring Hill, Birmingham, stated that on the previous day he was engaged at the Regent Road Gas-Works. Between twelve and one o'clock he and a labourer, named Cartwright, were in the smith's shop with the deceased, when they heard a loud explosion in the adjoining exhauster-house. They all three ran for protection underneath a work-bench at the end of the shop farthest from the exhauster-house, as the whole building was shaking from the effects of the explosion. After they had remained there a few moments the witness broke a window close to him, and calling to the other two men to follow him, stepped through it into the open air. Cartwright did the same, but the deceased remained in the building, and the witness did not see him again until he was taken to the hospital. He did not see the bars fall upon the deceased.

The CORONER said that this was the whole of the evidence that would be taken then, as the men who could give the really important information were so ill that on the previous day they could not even be spoken to on the subject. It would therefore be necessary to adjourn the inquiry, and it would be desirable for the jury to visit the gas-works that evening, as the engineer wished to repair, as soon as possible, the damage which had been done, in order that there might be no interruption to the supply of gas to the borough.

The inquest was adjourned till the 25th inst.

DEVIZES WATER SUPPLY.

LOCAL GOVERNMENT BOARD INQUIRY.

The Town Council of Devizes, having applied to the Local Government Board for sanction to borrow £11,000 for works of water supply, Lieut.-Col. PONSONBY COX, inspector, attended at the town-hall on Wednesday, the 15th ult., for the purpose of holding an inquiry, on behalf of the Local Government Board, into the subject matter of such application, and to receive the opinions of persons interested.

The TOWN-CLERK (Mr. A. G. Meek) explained the agreement which had been come to between the Town Council and the Crown for the purchase of a site for the water-works on Beckhampton Downs.

Mr. HENRY TOMLISON, C.E., the engineer for the proposed works, was then examined by the inspector. He stated that the drainage area which would form the sources of supply would not be less than three square miles in extent. The minimum flow of the springs at Calstone, in which direction the water percolated, would be about 3 million gallons in every 24 hours. The water flowed through chalk beds, and was, to a certain extent, already tapped by existing wells. There would be one covered reservoir, to contain 185,000 gallons. The water would flow by gravitation from the works to the town, there being a fall of 170 feet altogether. From the reservoir to the town there would be a main of 8 inches, and the "rising main" would be of 7 inches. He apprehended no engineering difficulties at all; it was a very simple work. The contract for sinking the well had been taken at £415, but that amount was subject to reduction, if he thought necessary. It was the extreme amount likely to be required, and he hoped in the execution of the work the cost might be reduced below the estimate, as he anticipated it would not be found necessary to go to the full depth stipulated, in which case a saving would be effected. The diameter of the upper portion of the well would be 8 feet, and of the lower portion 7 feet. The depth contracted for was 80 feet, being 30 feet below the water level, as ascertained by wells at present existing in the locality. The total estimated cost of the works was £11,000 gross, including certain commissions, contingencies, &c.

The TOWN-CLERK said that was the amount of the loan asked for. The previous loans were £7000, and £4000, which had been partially paid off by half-yearly instalments, principal and interest.

The INSPECTOR said the rateable value of the district was £21,886, and the borrowing powers of the council were twice that. Having already borrowed money amounting to £11,000 altogether, they had still power to obtain £32,000, from which they now proposed to take the amount for water-works. He asked whether they had made any estimate of the water-rents likely to be derived.

Mr. TOMLISON said he reckoned that from the second year the water-works would be self-supporting—the income would cover the expenditure.

The INSPECTOR asked what was the estimated cost of pumping.

Mr. TOMLISON said the cost of the labour in pumping would be very much reduced in the first two or three years by the services of the engine-men being utilized in other ways. In other works that he had carried out the working expenses had been covered in this way. The population of the borough was about 7000, and the present water supply was entirely from wells; there was no public supply.

The INSPECTOR: I ask that because, in your case, a water-rate will be entirely new.

The TOWN-CLERK: Yes; entirely new.

The INSPECTOR: And, being new, it will take a little time for people to come and ask for water as greedily as they possibly will in two or three years time.

The TOWN-CLERK: No doubt.

The INSPECTOR: The water supply to your population will be, as compared with most towns, a cheap one, undoubtedly. For anything under £2 per head—and you are below that—a water supply is undoubtedly a cheap one; it ought, I mean, without any difficulty, to be self-supporting. I know of many other instances in which water-works have to be constructed, and have to be made to pay, but which cost in proportion to population very much more than it is likely your works will cost.

The TOWN-CLERK: With regard to the loans, I may say that, previous to the 31st of December, and before the council had decided upon having any water-works, I made application, on behalf of the corporation, to the Public Works Loan Commissioners, for a loan of £5000. The council having resolved to have water-works, I have since communicated with the commissioners with a view of getting permission to amend my application, so as to obtain a loan of £11,000. The matter at present remains in abeyance, subject to this inquiry.

The INSPECTOR: During what period do you think of completing the works?

Mr. TOMLISON: Within three or four months from the time they are commenced.

The inquiry then terminated, and the inspector proceeded to examine the site of the proposed works.

WASTE OF GASLIGHT.

By Mr. G. BRAY, of Leeds.

[A paper read on Thursday, Aug. 2, before the Leeds Master Plumbers Association.]

(*Concluded from page* 385.)

The most serious source of the waste of light that takes place inside our homes is the apparatus, connected with our chandeliers, brackets, &c., which is made to surround the gas-flame. This apparatus has been constructed to gratify modern taste, and is composed, as you know, of globes, coronets, globe-holders of various thicknesses of metal, and pieces of metal, called ornaments, underneath the globe-holder.

I am not intending to find fault with the makers and designers of the various articles to which I am here taking exception, or with the architects or gas-fitters who use them. All classes of people have, no doubt, done their best in their separate departments; and it is not to be expected that an art which is of such vast importance, and which has sprung so rapidly into existence as that of gas lighting, should have grown to perfection with equal rapidity. Besides its rapid and vast growth, there has been no class of tradespeople who have been commercially interested in producing the most satisfactory result from the manufacture of the gas, right away through all the systems and arrangements it has to pass through, to the development and application of the light at the finish. There has been no one recognized line to which all trades connected with the art had to work; so each, taking his own course, has helped to produce the results which I to-night am trying to do something to remedy. Our chandelier makers have designed the metal parts connected with the globe, guided, doubtless, by appearances only, and regardless of the effects they would have in obstructing the downward passage of the light.

For a globe-holder nothing is required but the three forks projecting from the centre, with the necessary screws, and all as light as possible for the purpose. We want nothing that will obstruct the downward light to the desk or table, or that will cast a shadow in any direction, if that can be avoided. To help in accomplishing this, have no thick (or thin) metal rings round the globe-holder; and underneath the globe-holder have no saucer-shaped pieces of metal, or metal of any description, except the gas-pipe. I have seen some remarkable instances of light being obstructed by the fittings on our chandeliers.

In the house of a scientist in this town, to whom I occasionally pay a visit, is a chandelier having some pretensions to elegance. Being there on one occasion, the good lady of the house being busy with some needle-work, I saw her moving her work about from point to point on the table, trying to get within the rays of light which ought to have come freely down from the chandelier above. "The light is bad," said this good lady; and I am not sure that both she and her husband did not decide that the gas was bad. I at once saw what was the matter. The outlet for the light was closed up with the massive globe-holder and this ornamental thing, which I have brought for your inspection, and in which you will no doubt see old friends similar to those which you will have in your chandelier rooms, and will often have met with in your business journeyings. I removed the ornament; the holder I could not remove, as I had not a proper one to replace it with. The result was a decided surprise to my friends, who could see to read and sew with comfort, the light being afterwards increased by putting on suitable globes and globe-holders. As this result was produced without any increase in the consumption of gas (as I did not change the burners), I have often had a pleasant chaff with my friends regarding the wonderful result produced out of nothing.

The "terra cotta" coronet is one of the worst gaslight wasters, as compared with the good it has in it, which I ever remember to have seen. It is supposed to prevent the ceiling being smoked, and this it does to some extent, immediately over the burner; but what it saves in this respect is simply distributed over a larger area without throwing less dirt on the ceiling in the aggregate. At what cost is this obtained? The whole of the top light is obstructed, and a pall-like shadow, blacker than the worst blackened ceiling I ever saw, overhangs a room wherever those coronets are used. There is a little light reflected down by them, but that is infinitesimal, as compared with what they obstruct. Therefore, I say, "Discard the 'terra cotta' coronet absolutely as a worthless article."

The gas-globe is an ornamental article, for the honour of the introduction of which I have not been able to find an owner. It is scarcely anything else than ornamental, and that it is ornamental I am glad to have this opportunity of bearing testimony. I have often felt great pleasure in examining the well-executed designs, and the well-stocked show-rooms which I have sometimes the privilege of entering; but our designers of globes having to think only of what will please and sell, have no inducement to keep their designing within the bounds of what is useful; consequently, there is no wonder they travel outside those bounds, and that we should find to-day that there is considerable room for improvement. Globe-makers are not entirely to blame for all the defects one meets with in the globe. They make what they find to be asked for, and sometimes they are asked for strange articles. People having got plenty of gaslight, want something to "modify the glare;" but they want this, possible without thinking that light will be obstructed; that thought is left out of view, and they look only to having the "glare" modified. To meet this requirement, globes are offered to them thickly covered with figures, or with the whole surface ground; and latterly opal globes have been introduced to effect the same object, and the result they give is very pleasant to the eye. But what about the cost of all these things? When designers of globes, chandeliers, terra cotta coronets, &c., have done their best in nursing that interesting phenomenon—a gas-flame—and when people's tastes have been gratified to the fullest extent in these matters, the result of it all is that the light produced by the naked flame is obstructed to the extent of 70 per cent. Now there is no wonder that when people have succeeded in having their gas lighting apparatus beautified up to this point they then find out that "they want more light," that "the gas is poor," &c.

In making choice of globes, the public require and ought to know what the whole effect upon the light will be. Most of the gentlemen here present will be pretty well aware that these articles seriously interfere with the passage of light from the flame to the objects intended to be illuminated; others there may be who have had their minds opened to these facts, but the impressions from which have been allowed to slumber, and are, perhaps, now asleep; and generally there is an indifference which is, perhaps, excusable, seeing the multifarious and important duties a plumber is called upon to perform. But it is this indifference, if it exists, which I want to turn into interest.

I will give a few particulars regarding the light-obstructing power of globes, and then show you the effect practically in the apparatus before me. Clear glass obstructs from 10 to 15 per cent., according to its thickness and quality; ground glass obstructs from 25 to 40 per cent.; and from that to clear glass the loss is in proportion to the amount of ground or figured surface on the globe. Opal globes obstruct from 35 to 60 per cent. of the side light, according to the thickness of the glass, but give a good downward light if the hole be large, and the holder light and free from ornament underneath—not otherwise—and are pleasant to look at. As a rule, when people get fitted up with opal globes, they are pleased beyond what is lasting. It is no uncommon thing for them to make the discovery, after the first freshness of the pleasure is gone, that "they cannot see to read at a distance," as they could before. The idea of increased light, which some receive when first entering a room where these globes are used, is the result of an optical illusion. The globe presents a great luminous mass which is cheering to look upon, as is a bright fire. The light is not too intense for the eye to look upon with comfort, whereas, when a globe is used through which the flame can be seen, the light is not so cheering, because it is too bright to be looked at with comfort; and, whenever the eye comes in contact with the flame, the lighting of the room suffers by comparison therewith, just as in passing from a brilliantly lighted room into the gas-lit streets, the latter appear dark until the eye gets accustomed to the change. Further, where opal globes are used, the space surrounding them is always much darker than is the space underneath, and the actual underneath light appears greater than it is, because of the contrast with the surrounding comparative darkness. In my opinion opal globes are simply a passing fashion, which will soon begin to wane, because the light they obstruct will never be tolerated as a permanency.

If the "glare" of light is to be modified, ground glass will do it with less loss of light than opal, and, when ground glass is required for that purpose, the *under* part of the globe should always be clear, which arrangement will allow a free passage for the light downwards. Where globes are used simply for ornamental purposes, there is ample room for the exercise of the designer's art, without having the utility of the globe so seriously diminished by covering so much of its surface with figures, as is generally the case. In figured globes, as well as ground ones, the under part should always be clear.

I now come to speak of a part of the globe which I have taken specially in hand to improve, and which not only interferes with the downward passage of the light, but also destroys the steadiness of the flame. I allude to the opening in the bottom of the globe. I have no idea to whom the honour belongs of fixing the diameter of this part at 2 inches and under, but it is utterly inadequate for its present requirements. The column of air it admits is too limited and confined. In its upward rush the air too rapidly oxidises the centre of the flame, and curls up its edges, which become oxidized too little, and smoking points are the result, with great unsteadiness, which rises sometimes into a roar when the pineapple-shaped globes are used. Further, the hole being so small, it is difficult to apply a light without smoking the globe and holder, and the globes are difficult to handle while being cleaned, and are difficult to hold while being cut by the maker.

Seeing this long catalogue of objections scored against it, it is not very clear to me why the feature should have existed so long. I cannot but assume that the evil has been felt; but I am not so sure that the remedy has been so clearly seen. If the remedy had been seen, two considerations would, I think, have great influence in deterring globe-makers—and, may I add, gas-fitters?—from attempting a remedy—1. Under the new order of things, only one globe would be required for one gaslight, and that number is already required; therefore, there is no commercial reason there to induce them to be at the trouble of attempting a change. 2. The gauge being almost universally fixed at 2 inches, the evil is too ponderous to be grappled with. The evil is undoubtedly great, and, what makes matters worse, it is rapidly growing. This makes it the more necessary that something should be done to stop its course, and I have decided to take the initiative, and trust to obtain your co-operation.

The plan I propose for effecting this object is the following:—Instead of the 2-inch opening generally used, I propose that it should be altered to 3 inches. This alteration allows the flame to spread itself properly, and develop its illuminating power, and imparts to it steadiness, also giving much more downward light than the 2-inch hole; the globes and holders are not dirtied so much by the lighting of the gas, and are more easily handled and cleaned when dirty. The difference in effect of two globes of precisely the same pattern, with the exception of the holes, when placed over two similar gas-flames, is so striking, that I am satisfied the earnest attention of the trade only requires enlisting in the cause in order to have the change rapidly effected. I will again make use of the apparatus before me, and you will see the difference in the effect produced by the two kinds of globes. In the old globe you see the light dancing about, and in the new one almost perfectly steady, with an immense increase in the downward light. I think if you would try the experiment of having one of the new globes on one arm of a chandelier, and one of the old kind on another arm, in your own sitting-room, so that you can observe them constantly, your admiration for the new one will grow, until your dislike for the other grows to almost perfect hatred, and you will become, I think, fixed converts to the proposed new order of things.

I know there are 8 to 9 inch opal globes with 4-inch openings at the bottom, but these are not suited, nor are they intended for general use, and they are not the sizes I am speaking of. There are 7-inch opal globes with 2½-inch openings, but 2½ inches is not worth altering for, as that does not accomplish the end sought. I want the alteration made for every kind of 7-inch globe, no matter whether it is opal, or the kind more commonly used. A large number of these globes are already in use, and I have never heard a word of anything but praise regarding them. I may mention that I have no interest of any description in advocating this kind of globe, save the honour of being the author of such a desirable change.

Coming now to the close of my remarks regarding "Waste of Gaslight," and the remedies that may be applied to prevent the same, I would draw your attention to the consideration that the waste of light is not simply a question of pounds, shillings, and pence, but it is also a matter which has to do with the health and bodily comfort of those using it. Though lighting by coal gas has been almost unmixed comfort, yet it has not been quite so. We are all familiar with the fact that the atmosphere of our rooms becomes vitiated in proportion to the gas consumed therein. Efficient ventilation would remedy all this, but that is scarcely to be found; therefore the less gas we can use to adequately light our rooms the more healthy and comfortable they are. That an immense deal can be done to make them more comfortable I think I have fully shown in the remarks and experiments I have made.

Of course, I cannot tell what may be the outcome of this paper, but I should like to feel that it will be the commencement of an era wherein greater interest will be taken by the master plumbers of Leeds—and by them be communicated to their workmen—in one of the most important branches of their business. Before writing this paper I talked the matter over with some of your members, and the comments were varied. One said, "It is no use trying to move the master plumbers out of the old ruts, because it can't be done;" others were doubtful as to the possibility of rousing the interest I wish, while one of your number to whom I mentioned the matter gave it as his opinion that the business of plumber and gas-fitter would be a very different matter in a few years time to what it is now, and that a better technical knowledge of the various branches of their business would have to be acquired, in order to ensure success; and he thought that very much good would be done by the reading a paper of this description. I am inclined to the latter gentleman's belief. It will be readily admitted, I dare say, that sufficient knowledge of this subject has not hitherto been displayed, and if some of you were to see the comments made regarding gas-fitters work and knowledge by our gas authorities, you would think that there were either some mistaken opinions being experessed, or that some improvement was desirable and must be made. I cannot always agree with the censures which are hurled indiscriminately at gas-fitters, because I think too much is generally expected of them. It frequently appears to be forgotten that the art of gas lighting, in all its varied forms, has sprung into existence in little more than a generation, and that alterations—not always to call them improvements—have almost too rapidly succeeded each other to allow of accurate knowledge being obtained regarding them, particularly by gentlemen who have so many other duties to perform as have our modern plumbers and gas-fitters; but these are only strong reasons why more interest should be taken in the matter. Another reason is that our gas authorities are everywhere becoming dissatisfied with what is done for gas consumers after the gas supply leaves the company's hands, and the question is being agitated by the companies as to the advisability of taking the gas-fitting business into their own hands. This, I feel confident, as a rule, is not what they desire, because they have more than sufficient to do in their own scarcely ever-ending sphere, and would much prefer that the gas-fitters should be left in possession of their present field, if that can be done with some nearer approach to satisfaction than is now the case. Gentlemen, I now leave the matter with you, and only hope that my remarks may have been interesting to you.

BARNSTAPLE WATER COMPANY.—The half-yearly meeting was held on the 27th ult.—Mr. H. K. Thorne in the chair. The secretary (Mr. Heard) read the report of the directors, which stated that the balance standing to the credit of the company amounted to £557 19s. 2d. After payment of a dividend of 8s. per share, there would be in the hands of the treasurer £87 19s. 2d., which the directors were of opinion would be equal to the payment of any outstanding accounts and the cost of repairs to be executed during the remainder of the present year. The directors, therefore, recommended the payment of 8s. per share, which represented 8 per cent. to the original shareholders, on and after the 1st of September next. The report was adopted.

GAS-WORKS WITHOUT HOLDERS.*

A story is told of Charles II. having, in the early days of the Royal Society, greatly puzzled that learned body with the question, "Why it is that an evenly-balanced bucket of water becomes no heavier by the addition of a live fish swimming in it?"

The problem submitted as the subject of an essay to the North British Gas Managers, although looking suspiciously like the humorous pleasantry concealed in the Royal problem, is accompanied by a substantial inducement to attempt a solution in the affirmative, offered by a respected namesake of the Royal Stewart.

It might be creditable to the originality of any practical gas engineer, who would seriously undertake to show how the gasholder in modern gas-works can be safely dispensed with in the part it plays in gas supply, and by what kind of contrivances he should undertake to supersede its functions, and fulfil the same purposes. The bare proposal might resemble a new reading of the tragedy of "Hamlet" with the title *rôle* left out. At all events, the ingenious attempt, if not proving quite satisfactory, might put the audience in good humour by its comical features.

This essay is to show that gasholders cannot be dispensed with in the production and supply of coal gas, and that nothing can be adopted as a substitute that can equally serve the same important purposes.

It is assumed at the outset that Mr. Stewart's problem applies only to the ordinary business of coal gas companies, who distil the gas by retorts in the usual way, and supply the same for ordinary gas consumption, and has no reference to other industries, such as mineral oil works, coke ovens, &c., where large quantities of coal gas are produced, and generally utilized as a mere secondary product.

As a commercial commodity, coal gas was quite unknown before the present century, and its early history and progress, like that of the steam-engine and railways, was beset with numerous difficulties, which had to be overcome before the art of gas lighting attained satisfactory working form. Much of this was due to the peculiarities of an element invisible to the eye, inflammable when ignited in the atmosphere, violently explosive when mixed in certain proportions therewith, and, unless securely confined from atmospheric contact, this very light and diffusive element would escape like an invisible spirit, and lose itself into the surrounding air. In addition to these subtle properties of coal gas, the space required to contain the volume of gas eliminated from a ton of coal exceeded the dimensions of that mineral by several hundredfold, and the difficulty of dealing with a saleable commodity of such bulk stood for long in the way of making it easily available for the service of the general public.

To the early fathers of gas lighting, the magnitude of storing and distributing plant of a modern gas-works could never have been thought of, while their efforts were directed to meet the object in view by compressing the elastic gas into a small fraction of its natural bulk, and by the medium of portable gas companies serve out to their consumers daily supplies of gas, delivered in the manner of the milkman, the returning vans bringing back the empties to be replenished for the following day.

The great cost and inconvenience of this traffic was soon found to be intolerable, and gradually gave place to storing gasholders, and improved mains and service-pipes connecting consumers directly therewith, from whence, without restriction, they could draw off such supplies as they might desire.

By the gasholder, all previous difficulty in maintaining a satisfactory and abundant supply was extinguished once and for ever. And now, after half a century, the huge and familiar form of the modern gasholder may be seen in every considerable town in the civilized world, and is so associated in the mind with the gas manufactory that it is difficult to conceive of the one without the other.

The requirements of gas supply bear a close analogy to the supply of water for any large community. To be satisfactory, both require to be constant and abundant. In the case of water supply as a direct product of nature, it is intermittent and variable with the rainfall, which either greatly exceeds or falls short of the daily rate at which it is required for the service of a large town, and can only be made serviceable by the intervention of large reservoirs, wherein the surplus of wet seasons can be accumulated so as to uphold a constant delivery to the consumers in periods of drought.

Unlike water supplies, gas, being a manufactured article, is not subject to interruptions in its production, but it is much more uncertain and fluctuating in the rate of consumption than with water. The rate of gas consumption in this country may be estimated generally as three or four times greater at Christmas than at Midsummer, and a well-equipped gas manufactory ought to be adequate to furnish the daily supply required for one of the darkest days at the Christmas season.

The best experience has proved that the distillation of coal into gas can be most economically conducted by a steady maintenance of the heat of the retorts, and this again is so dependent on their being kept constantly at work, that, unless they are so, it is impossible to realize satisfactory results from carbonization—the first, and by far the most important, process in manufacture, on which prosperity depends.

Continuous carbonization being a necessity, and carried on during 24 hours daily, provision for storing the gas thus made in daylight, for distribution during the lighting hours, is indispensable; and the quantities so stored must be adequate, not only to meet the probable requirements during the hours the sun is beneath the horizon, which may be found in the almanac, but also the enormous extra demand that frequently arises without premonition, in a winter's day becoming overcast or darkened by fogs, when 30 or 40 per cent. more gas is drawn away for consumption than the mean average due to the season of the year, or the mean producing power of the works when this occurs. Some sort of reservoir is, therefore, required into which the surplus manufacture of one day may be drawn upon to meet extra consumption on the next.

In dealing with coal gas, no kind of reservoir will suit the purpose, unless so contrived that the gas can by no possibility mix itself or be mixed with atmospheric air.

It must be in direct and open communication with the manufactory, so as to admit the gas freely and fully as it is produced.

It must also be in direct and open communication with the distributing main-pipes for the delivery of its contents to the consumers.

Its capacity must be large enough to contain, when full, a sufficient volume of gas to meet the consumption, and its capacity when full must be capable of contracting in dimensions to accommodate exactly, neither more nor less, any lesser volume of gas with which it may be charged, down to zero.

The expansion and contraction of internal capacity must be self-acting, enlarging or diminishing its dimensions as the inflow or the outflow for the time predominates.

Some device is required to impress a constant and duly regulated force upon the outgoing stream of gas as it passes along the street-mains to the consumers.

In water supply from an elevated reservoir, gravitation, acting upon the fluid itself, ensures its delivery at any lower level; the contrary effect takes place with gas, and is much more variable than with water.

Gravitation is, nevertheless, the appropriate agency for impelling a stream of gas along the mains; but instead of acting upon the fluid directly, as in the case of water, it is desirable that it should act on the vessel containing it, and therefore the containing vessel should have to descend by its own gravity when discharging its contents, and yield itself by rising in obedience to the superior force of the ingoing stream from the manufactory, when the rate of inflow exceeds the rate of discharge.

The modern gasholder fulfils every condition above referred to, and it is difficult to imagine any other method of attaining the same objects.

There is nothing new under the sun. Nature, ever full of teaching and example, has shown us, by the structure of the heaving chest of all air-breathing animals, how it should expand and contract its capacity with every respiration.

Whether the inventor of the gasholder was an Englishman or a Scotchman is a question of little moment; neither could claim much originality in its conception, as both had before them opposite and practical examples of the operation of the same principle as old as Tubal, while listening to the solemn strains of the stately organ, or (pardon the sinful want of natural taste) to the shrill and steady squeal of the Highland bagpipe. Both, as wind instruments, owe their unbroken flow of sound to the flexible bellows or leather bag, into which, by lever or lungs, the actuating wind is pumped in by irregular blasts and puffs.

The gasholder acts in precisely the same fashion, and for a similar purpose, and does its work so steadily and satisfactorily, that there is no other practicable and economical contrivance that will serve the same purpose so well, if at all.

WATER-LUTE.

* A letter, signed W. L., in our "Correspondence" columns, explains the origin of this paper.

DALZIEL'S NON-TILTING METER.

[A paper presented at the last meeting of the North British Association of Gas Managers.]

During the past 25 years of my experience as surveyor of meters, collector of gas-rates, and manager in Kilmarnock, like many of my brother managers, I have been frequently annoyed, and more especially in mid-winter, when the consumption of gas is greatest, by a number of consumers tilting forward their meters and running off the water to such an extent as only to indicate partially how much gas has been consumed.

It is the custom of such parties, after the meter is filled up with water, to let it register correctly for a few days, then tilt it forward, and let it remain in that state till near the time that the surveyor may be expected to make his visit, when the meter is filled up, and, as a matter of course, the surveyor, when he calls, finds the meter all right, although he may be suspicious, from his knowledge of the party's business or habits, that the meter has been tampered with.

I have tried various meters, and all have the same defect—viz., that when tilted forward the water overflows into the waste chamber, leaving the measuring chambers of the drum so open that the gas passes on to the burners without causing the drum to move, the meter not indicating. My attention was called to this more particularly last winter, when I fined three parties 40s. each for defrauding the corporation in this way.

I considered there should be a remedy for this, simple in its application, certain in its action, and be of such a nature that if the water was abstracted by tilting forward the supply of gas would be cut off till refilled again.

After a few experiments, I came to the conclusion that by bringing forward the spout of the meter close to the front plate, and putting on a conical valve underneath the inlet to the drum, it would have the desired effect.

Having fitted up a Warner and Cowan's meter with this valve, it fully realized my expectations, that when tilted forward, the supply of gas was cut off promptly, and what I conceive to be a more important advantage, while the pressure of gas was on, the water—instead of running into the waste chamber like other meters, thereby opening the compartments of the drum—is, by the pressure of the gas, forced down under the water level, passes under the diaphragm into the back part of the meter, and is retained there so long as the meter is tilted, the supply of gas at the same time being entirely cut off. The instant the meter is set right, the conical valve opens, the water returns to its place, and the meter indicates correctly as before.

By adding this valve to the meter, suppose the water should be run off by tilting, the supply of gas will be cut off, and when put into position again, if the float is working right, the gas will not pass on to the burners till the meter is filled up with water, thus giving gas managers, when they have the least suspicion of parties attempting to obtain gas fraudulently, a simple remedy for corporations and gas companies protecting themselves, by causing all such parties to pay for the full amount of gas consumed, as the instant the meter is tilted forward, with the intention of defrauding the gas company by running off the water, such parties would be under the necessity of putting the meter back to its proper level before they could get gas, thus giving corporations and companies protection both by float and conical valve.

The great advantage in this valve is that its parts are few, simple in their nature, inexpensive as to cost, and at same time certain in its action, and not liable to get out of order.

HULL CORPORATION WATER-WORKS.—The accounts for the year ending the 31st of August have just been published. They show that the amount received for water-rents during the year was £20,784, and from miscellaneous sources, £490; making a total of £21,274. The working expenses at Stoneferry amounted to £7064, and at Springhead £3500, from which £225 is deducted for value of stock in hand from last year, making the net expenditure £10,339. The sum of £2600 has been paid over to the borough fund during the year, as directed by Act of Parliament, and £8142 has been paid as interest on borrowed capital. The net income, therefore, over ordinary expenditure amounts to £237. In a supplemental account, it is shown that the balance due from the late treasurer to the Water-Works Committee on the 31st of July last was £15,976. During the past year £8268 has been expended on capital (construction) account.

FOLKESTONE WATER-WORKS COMPANY.—The half-yearly meeting was held on the 29th ult.—Captain R. Bury in the chair. The directors in their report stated that the affairs of the company were in a prosperous condition, and they recommended that a dividend after the rate of £7 10s. per cent. per annum, for the half year, should be paid. The new well, being sunk by the company at the Cherry Gardens, was progressing favourably, and a greater depth had been reached in the sand formation than had hitherto been accomplished. It was stated that John Parsons, the late collector, was a defaulter to the extent of £161 4s. 10d., as admitted by him. A resolution was proposed that it be an instruction from this meeting to the directors that they prosecute John Parsons before the magistrates for the default committed by him to the extent of £161 4s. 10d., as mentioned in the directors report. A discussion took place on the proposal, and ultimately the matter was left to the directors to consider, and report upon at a future meeting.

LONDON WATER SUPPLY.

[Extract from an Article on "Recent Science," in the current number of *The Nineteenth Century*.]

It would probably be difficult to find any practical question on which the teachings of science have a better right to be heard than on that of water supply. Whether a given sample of water is wholesome or unwholesome is not to be settled simply by the eye and the palate, or even in all cases by microscopic examination. It often happens, indeed, that water which the chemist would not hesitate to condemn may be seductively clear, sparkling, and palatable; whilst, on the other hand, water which may excite suspicion by its discoloration will be pronounced by the chemist, and found by experience, to be quite free from danger. But if chemical science is thus necessary to help us to a decision as to the quality of our drinking water, geological science is surely not less necessary to guide us in our search for new sources of supply. How to obtain an abundance of wholesome water from subterranean reservoirs is a perplexing problem which the geologist often finds himself called upon to solve, and the solution of which becomes more imperative as the population continues to increase. Important enough anywhere, the question is supremely important in the Metropolis. Anything that science may have to suggest for improving the water supply of London is consequently sure of a ready hearing, and we are by no means surprised that our daily press should have frequently called attention during the last month or two to the deep boring for water which has been executed at Messrs. Meux's brewery in Tottenham Court Road. It may be useful to show why this experiment is of peculiar interest to geologists, and how a private enterprise of this kind may become of vast importance to the public.*

From time immemorial water has been drawn, by means of shallow wells, from the great bed of gravel on which so large a part of London is seated, and which stretches for a considerable distance both north and south of the Thames. Here and there this gravel is covered with thin patches of a loamy deposit, extensively worked as brick-earth. Beneath the gravel we invariably come down upon the London clay, which forms, indeed, the fundamental rock in this part of the valley of the Thames, and upon which the gravel was deposited at a late geological period, when the Thames was a river of much larger volume than at present. Rain falling upon this bed of porous gravel soaks in until it finds its way down to the surface of the London clay, where its progress is stopped by the impervious character of that tough material. The gravel thus forms a large reservoir of water, held up by a floor of stiff clay. Small streams have in places cut valleys through the gravel, and the water then issues forth as a spring at its junction with the clay; such springs have given names to Clerkenwell, Bagnigge Wells, &c. But if the water does not thus drain away naturally, it may be drawn off by means of shallow wells; and it was in this manner that London was for centuries supplied with water. Hence, in those outskirts of the City in which the soil was not gravelly or otherwise porous, there was no water supply, and it was consequently useless to build there until the water companies had extended their works thither. Professor Prestwich has well shown how the growth of London in early times followed, without deviation, the direction of this extensive bed of gravel.

But, as London grew, the wells multiplied; and the water-bearing resources of the gravel—rarely more than 20 feet thick—became overtaxed, and were at last unequal to the increased demand. Moreover, this shallow water supply became polluted by surface drainage, and was therefore to be avoided. The old method of disposing of sewage, still practised in certain parts of the country, consisted in digging a shaft in the permeable gravel, not deep enough to reach the water level. A dry well was thus made for the reception of sewage; but the liquid portion, draining away, filtered through the gravel, and as a matter of course contaminated the water drawn from the deeper wells in the neighbourhood. It is true that during this filtration through the soil much of the organic matter becomes oxidized and converted into innocuous compounds. Yet there is always danger lest the natural purification should remain incomplete. Hence many of the public pumps in London, drawing their supply from the surface gravel, have very properly been closed, though yielding water which was clear, cool, and sparkling. The often-cited case of the pump near Golden Square, which was clearly connected with the cholera outbreak of 1854, sufficiently shows the danger of drawing water from a superficial source in a populated district.

In seeking a deeper seated source of water, the borer has to pass through London clay, which in places may be as much as 400 feet in thickness, until it reaches the series of beds known as the lower London tertiaries, among which are certain water-bearing sands of considerable thickness. On the south side of the London basin they come to the surface in Surrey, while on the north side they crop out in Hertfordshire; and in their underground extension between these two exposures they are buried beneath the London clay. The water which they receive on their exposed surfaces is therefore carried down, and, being prevented from rising by the overlying mass of retentive clay, forms a deep-seated subterranean store accessible to the boring-rod. These water-charged beds are to be found beneath London at a depth of generally from 100 to 200 feet. Where they come to the surface at the margins of the shallow trough of London clay, they are considerably above the level of the Thames. It is clear, therefore, that we have here all the conditions favourable for the construction of Artesian wells. When a boring is carried down deep enough to reach the sands beneath London, the pent-up water is forced upwards by hydrostatic pressure, and, tending to find its own level, rises in the bore-hole, and may even overflow. Such was in fact the case when Artesian wells were first introduced in the neighbourhood of London; but the water-bearing beds are comparatively thin, and the drain of numerous wells soon began to tell upon their limited capacity. Indeed, so many of these deep wells were constructed, that the rainfall upon the narrow outcrop of the porous lower tertiaries became insufficient to feed them as rapidly as the water was withdrawn, and hence the water-line beneath London has been very considerably lowered.

Forced, then, to go still deeper, engineers have of late years bored into the chalk, which is the rock immediately beneath the lowest of the tertiary sands, or the beds known as Thanet sand. On boring beneath London to a depth varying from 150 to nearly 300 feet, the chalk may be reached; but it by no means follows that a good supply of water will be obtained. The chalk is, indeed, permeable, but it holds the water with considerable tenacity, and it is believed that the deep wells in the chalk are fed not so much by the water in the saturated rock as by that which accumulates in fissures, joints, and caverns. But as no man can foresee the position of these cracks and hollows, it is clear that boring for water in chalk is a matter of much uncertainty. Still many of the wells carried into the chalk below the line of saturation have yielded almost inexhaustible supplies. But here again the constant drain by our deep wells has lowered the water level, so that the water does not mount up so near to the surface as it formerly did. Hence we are tempted to inquire whether it is not possible to get a more constant supply from rocks yet lower in the geological series—whether, in short, we cannot imitate the Parisian engineers, and draw our supply from the strata beneath the chalk.

It is well known that Paris and London are situated under strikingly similar geological conditions. In the Paris basin Artesian wells have been carried through the chalk into the underlying strata, and have for many years been discharging water from porous rocks belonging to the Neocomian series, popularly known as the lower greensand. The famous boring at Grenelle, a suburb in the south-west of Paris, is the best known example of these deep Artesian wells. Although the work of boring at Grenelle was commenced in 1833, the reservoirs of the lower greensand were not tapped until 1841, when the well had attained to a depth of 1798 feet. It is curious to trace the way in which such a well is fed. Rain, falling upon the exposed surface of the lower greensand in the far-distant district of Champagne, travels underground, for something like 100 miles, through beds not more, perhaps, than 40 or 50 feet in thickness, and gushes up at Grenelle at the rate of more than 880,000 gallons daily. An Artesian well at Passy draws 3,500,000 gallons every 24 hours from the lower greensand, at a depth of 1923 feet; and latterly other wells on the same principle, but of still greater magnitude, have been sunk in Paris. With these results before us, it may naturally be asked why we are not able to draw upon similar resources beneath London, and thus put a stop to all complaints about supplying the Metropolis from polluted rivers. This is, in fact, what Messrs. Meux have attempted, but why it has not been done by others needs some explanation.

In 1854 the Hampstead and Highgate Water-Works Company carried a boring at Kentish Town down to the great depth of 1302 feet. After piercing the usual strata, comprising the London clay, the lower tertiaries, and the chalk, the borer penetrated the upper greensand, which is a thin deposit immediately underlying the chalk, and of no great importance for our present purpose. Then about 130 feet of stiff gault clay was passed through, and in the normal sequence of the beds any geologist would have expected this to be followed by the lower greensand. But, to the surprise of most people, the borer brought up red clays, reddish and greyish sandstones, and other rocks, entirely unlike any of the Neocomian strata. The age of these red rocks was extremely doubtful, some authorities holding that they might belong to the new red sandstone, but most geologists suspected that they were Palæozoic, and probably of Devonian age. Here, then, was a startling irregularity in the sequence of the strata, and the Kentish Town well was accordingly abandoned.

All round the girdle of gault which crops out to the north, the south, and the west of the London basin, we may trace the lower greensand, and no one would suspect that it did not pass beneath London, just as we know it passes beneath Paris. Yet the Kentish Town boring led us to assume that this was not the case—an assumption which was strengthened by evidence obtained in 1857 by a boring at Harwich. This boring showed that immediately beneath the gault in that locality, and at a depth of 1200 feet from the surface, there are black slaty rocks with a decidedly Palæozoic appearance, and probably belonging to the carboniferous series. Instead, therefore, of the strata following in regular order, there appeared to be in the south-eastern part of England a huge gap in the geological series, the lower greensand and the great series of Jurassic rocks being in certain districts altogether absent.

Prior to the date of these borings, and, therefore, on entirely independent grounds, Mr. Godwin-Austen had been led to the remarkable conclusion that a ridge of old rocks runs along the line of the Thames Valley, and probably connects the coal-fields of Bath and Bristol with those of the Pas-de-Calais and Belgium. The remarkably acute reasoning in Mr. Godwin-Austen's paper, published in 1855, received striking confirmation from the borings at Kentish Town and at Harwich; and in the face of such evidence it was perhaps hardly to be supposed that any more deep borings would be made near London with the view of reaching water below the chalk. Yet it is obvious that if the Palæozoic ridge is not of great width, or if the Kentish Town boring happened to be near one of its margins, the lower greensand, which we know to exist not far off, may be present, though in smaller thickness, under certain parts of the Metropolis. After all, it must be borne in mind that considerable doubt hangs over the exact geological position of the red rocks at Kentish Town, and it has even been suggested that they really belong to Neocomian strata.

Sufficient has now been said to explain the peculiar interest with which geologists have of late years watched any deep borings in London or thereabouts. It is uncomfortable to feel that the structure of the ground beneath your very feet remains an unsolved enigma; but it will be seen that this is something more than a point of pure geology. If the lower greensand really passed under London, as it certainly passes under Paris, it would probably hold water, and hence a new supply of wholesome water might be offered to the Metropolis. No experiment, however, has hitherto settled this important point. At the southern outfall works at Crossness, a boring has been carried into the gault to a depth of 950 feet from the surface;* and at the Loughton Station on the Great Eastern Railway the gault was reached at about 980 feet, and the boring afterwards carried down to a total depth of 1092 feet. Neither of these recently executed deep borings has, however, given us a clear insight into the nature of the beds beneath the gault—a secret which it remained for Messrs. Meux's well to reveal.

As far back as 1843, Messrs. Meux and Co. put down a deep well at their Horseshoe Brewery. This well was sunk to a depth of 188 feet, and afterwards continued by boring to a total depth of about 365 feet. At this spot the London clay was found to be something like 63 feet in thickness, and it was followed by 72 feet of lower London tertiaries. Reckoning that the superficial deposits were about 23 feet thick, the total depth from the surface before the white chalk was reached amounted to 158 feet. About 207 feet of chalk was bored through, and during this boring water was obtained in abundance. Of late years, however, the supply of the old well has failed, and it was determined to deepen and enlarge the boring, in the hope of tapping fresh supplies. To effect this object, the Diamond Rock Boring Company's method has been employed. The crown of the borer consists of a large cylinder of steel, having 12 black diamonds of the Brazilian variety called "carbonado," embedded alternately in the inner and outer edges of the cutting head. By the rapid rotation of this cylinder armed with diamonds, a hole is readily drilled, and solid cores of rock are extracted. These cores, measuring upwards of a foot in diameter, look like stone columns turned on a lathe. At a depth of 812 feet from the surface the chalk came to an end, and the upper greensand was reached. The gault, which is the rock immediately beneath, was touched at about 840 feet, and this clay continued down to a depth of nearly 1000 feet. The thin nodular beds at the base of the gault were then met with, and at 1001 feet the lower greensand was reached. A limited supply of water was obtained, and the rumour rapidly spread that a new source of water supply was opened up. There seems, indeed, but little doubt that some member of the Neocomian formation was here in its normal position beneath the gault, and probably the siliceous limestone brought up by the borer represents the Hythe beds, which are of upper Neocomian age. Much of the rock in the cores possessed an oolitic texture, and some of it contained

* For the subject discussed in this article, see the "Reports of the Royal Commissions on Water Supply and on the Pollution of Rivers;" Mr. Prestwich's "Water-Bearing Strata of the Country around London" (1851), and his "Address to the Geological Society" (1872); Mr. Whitaker's "Geology of the London Basin" (1872), and his "Guide to the Geology of London" (Stanford, 1875); and Professor Judd's article in *Nature*, May 3, 1877.

* As this sheet is passing through the press, we learn that a new boring at Crossness has been carried through the gault into red clay of doubtful age.

casts of fossils, such as species of *Trigonia* and *Protocardium*, recognized by Mr. R. Etheridge, of the Geological Survey, as characteristic of the lower greensand. The boring shows, then, that the lower greensand does exist under London; and on the strength of this discovery great hopes were entertained of its water-bearing characters.

Such hopes were, however, doomed to disappointment. On May 1 the character of the strata entirely changed, the horizontal beds suddenly giving place to purple and green shales, dipping at an angle of upwards of 30°. Since the cores are necessarily rotated in drilling them out, and in bringing them to the surface, it is impossible to determine the direction of dip, though the oblique fracture of the cores shows its amount plainly enough. The fact that the horizontal beds thus rest upon inclined strata proved their decided uniformity, whilst the lithological characters of the shales strongly suggested Palæozoic relations. Yet for some days it was impossible to determine what formation they represented, since no characteristic fossils could be found in the cores. On the 12th of May, however, Mr. Etheridge, who has paid constant attention to the boring, and has been eagerly looking out for any organic remains that might indicate the age of the rocks, was rewarded by discovering several well-marked fossils in cores of shales obtained from a depth of 1175 feet. These are unmistakably Devonian species. Among the fossils we may mention *Spirifera disjuncta*, *Rhynchonella cuboides*, an *Edmondia*, and an *Axinus*. On this and on other evidence Mr. Etheridge feels justified in referring the shales to the upper part of the Devonian series, correlating them rather with the rocks of the Eifel than with those of this country. Although there was but little chance of piercing any great thickness of available water-bearing strata after reaching these old rocks, Messrs. Meux were nevertheless enterprising enough to push the boring down to a depth of 1144 feet.

It will be observed that the results of this experiment are quite in accord with those of the borings at Kentish Town and Harwich, and strikingly confirm the conclusions of Mr. Godwin-Austen as to the presence of Palæozoic rocks at a moderate depth beneath London. We learn, indeed, from the well at the Horseshoe Brewery that the lower greensand thins below this part of the Metropolis, and assumes peculiar conditions, but is not highly charged with water. The entire series of oolites and lias appears to be either altogether absent or represented only in the very feeblest proportions, whilst the Palæozoic rocks which come so near to the base of the gault are undoubtedly of Devonian age. Save, perhaps, the famous Sub-Wealden exploration, no experiment made of late years in stratigraphical geology has been more interesting than the deepening of Messrs. Meux's well. It proves the accuracy of Mr. Prestwich's estimate of the thickness of the chalk under London (650 feet), and it equally proves the accuracy of Mr. Godwin-Austen's views as to the occurrence of Palæozoic rocks beneath our cretaceous strata. At the same time, the results of the work by no means support the statements which were current a few weeks ago, to the effect that a new source of water supply had been struck in the lower greensand beneath London.

PLYMOUTH WATER SUPPLY.

At the Meeting of the Mechanical Science Section of the British Association, at Plymouth, on the 16th inst.,

Mr. G. D. Bellamy contributed a paper upon the subject of the "Plymouth Water-Works." He said the credit of the great work of bringing a stream from the river Mew into the town of Plymouth had been uniformly ascribed to the celebrated navigator Sir Francis Drake, who, in 1581, occupied the position of mayor of the borough. The familiar names of the Copplestons, of Warleigh; the Elfords, of Shepstor; the Trelawnys, of Budshead (now St. Budeaux); and the contemporary corporate authorities of Plymouth, should also be mentioned as interested in the scheme. Through family interest, easy terms were arranged for the acquirement of land, and in 1585 the town obtained the Act under which it has ever since been supplied. The work was commenced in 1589, and the plan adopted in laying out the course of the channel was simply to lead the water from its source, where it would follow the contour of the hillsides. After a course of 17 miles, the stream entered the town, being formally introduced, amid great public rejoicing, on April 24, 1590. The main supply-pipe was formed, and about 30 public conduits were erected, from time to time, to distribute the water throughout the town. Though various alterations were effected, the general character of the works remained unchanged down to 1822, when considerable improvements were instituted. At this time the Government, who were building the new victualling yard at Stonehouse, required a large supply of water for the shipping, and, in the Act passed to supply the yard, the corporation strengthened their position by procuring the insertion of clauses imposing penalties on persons interfering with the stream. At the same time the supply of water to the public conduits, many of which had become sources of public inconvenience, was discontinued—though it met with opposition—and effective provision was made for the domestic supply of the inhabitants; iron pipes replaced the lead ones, the reservoirs at Drake's Place were constructed, and fire-plugs were fixed in the streets. The cost of these improvements was estimated at £15,000. Between 1817 and 1826 the average income of the water-works was about £450, and now it had increased to a gross income of between £8000 and £9000, but this was subject to heavy deductions for maintenance and repairs. The original system of supply from the Head Weir, near Shepstor, was still in vogue. The reservoir at Hartley, 300 feet above the sea level, containing about 8 million gallons, was the main distributing source for the entire town and suburbs. The area of the watershed drained by the river at the Head Weir was between 4000 and 5000 acres, and, as the average rainfall amounted to over 55 inches per annum, a copious supply was afforded at all seasons. Owing to its excellent filtration, the water was remarkably pure and soft in quality. The irregularities in the supply, peculiar alike to all mountain watersheds, had forced on the corporation the necessity of increased storeage, which was the only thing now required to render the water supply of Plymouth equal in adequacy, as well as purity, to that of any town in the country.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

In the coal trade of the two counties adjacant to this town, there is a good deal of uncertainty as to the immediate future, owing to the undecided state of the relations between masters and men on the wages question. The men held a general representative meeting at Barnsley, on Monday last, and not only decided to refuse to accept any reduction of pay, but also not to allow the question to be arbitrated upon. This decision was subsequently communicated to the secretary of the South Yorkshire and North Derbyshire Coalowners Association, Limited, and is now under the consideration of the executive committee of that body. If the employers endeavour to enforce the reduction, whether of 5 per cent. or any other amount, there can be no doubt whatever that the men would strike rather than submit. The miners, however, are of opinion that the coalowners will let the matter drop at present, seeing that the cold weather has now set in, with a consequent improvement of trade at many of the pits. The masters decision will, in either case, be known in a few days.

The iron trade remains quiet in all directions, and pig producers are gradually, but surely, reducing their output, with the view of bringing the supply more on a level with the requirements of buyers. Pig iron figures are, consequently, anything but stiff for all the ordinary brands. At Leeds, the Aireside Company are stated to have blown in a furnace which had for a time been damped down. For North Lincolnshire pig there is a smaller demand than for some time past. There is hardly any inquiry at all for merchant iron, owing to the dulness of many of the local hardware trades, nor is the call for manufactured qualities by any means strong.

In the Bessemer steel and rail trade there is considerable activity, to a great extent owing to large Government orders for India, where additional lines are being constructed to meet the urgent wants of the famine districts. In the other local industries there has been no particular change during the week.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There is no particularly new feature to notice with regard to the gas coal trade of this district. There is still a large quantity of this class of fuel offering in the market, and consumers generally are able to place their contracts at low prices. I understand that some of the gas companies have been able to secure contracts for deliveries extending over a considerable period on very favourable terms, and Lancashire colliery proprietors have found it very difficult to compete with coal offered from other districts. For other classes of good round coal rather more inquiry has been springing up, but this appears to be chiefly with the view of testing the market as to the terms on which winter stocks can be secured, and trade generally continues very dull. House fire classes of coal still move off only slowly, and, with the continued depression in the iron trade, there is still but little demand for the common classes of round coal, which are a drug in the market. Engine classes of coal, which so far have not been difficult to dispose of, are becoming more plentiful, especially the inferior sorts, and this, to some extent, may be attributed to the strike in the Bolton cotton trade, and the long continued period of wet weather, which has so much interfered with brick-making. So far as the quoted prices are concerned, there is no material change, as they are now about as low as they can possibly go, but for large orders for immediate delivery there are still sellers disposed to take a trifle less money, and buyers in many cases scarcely yet seem satisfied that the lowest point has yet been reached. The average pit prices may be given at 10s. per ton for good Arley, 8s. to 8s. 6d. per ton for Pemberton four-feet, 6s. to 7s. for common coal, 5s. to 5s. 6d. for burgy, and 3s. 6d. to 4s. 3d. for slack.

The wages dispute in the Ashton district has been settled by arbitration. The masters gave notice for a reduction of about 16 per cent., and the umpire has awarded 5 per cent. with some exceptions.

In the iron trade the demand continues very limited and Lancashire makers of pig iron, whose stocks have been increasing for months past, have made a reduction of 2s. per ton on their list rates, which brings the quotations for delivery into the Manchester district down to 51s. per ton for No. 3 foundry, and 50s. for No. 4 forge, less 2½ per cent., which is a lower figure than has ever before been quoted for Lancashire pig iron, and at which I am informed the makers lose on every ton they sell. In the finished iron trade there is no change, and prices remain the same as those last quoted.

THE COAL AND GENERAL TRADE OF THE NORTH.

(FROM OUR OWN CORRESPONDENT.)

The general shipments of coals from the Tyne and Wear were below an average last week. Gas shipments to the coast and nearer ports of Europe were rather larger, with a better demand for the Mediterranean. Some more cargoes of the best qualities of Durham gas coals have been shipped to Boston, U.S., at a freight of 7s. 6d. per ton. This is an unusual shipment, and it shows what low freight and a moderate price for coals do in the development of trade, and in beating inland competition. There is a free supply of gas coals. There is no talk of any fresh contracts having been entered upon for the winter, and a good deal of business is likely to be done this autumn in the open market. Prices have undergone no alteration—8s. 6d. per ton is the quoted price for the very best sorts of gas coals; but a very large amount of business is transacted at prices ranging from 7s. to 8s. per ton, but at such quotations prices are likely to remain. The price of steam coal is rather weaker; say from 3d. to 6d. per ton less in some instances. House coals are in fair demand at recent quotations. The pits work moderately. Shipping turns, as a rule, do not exceed three days.

The inquiry for steam tonnage is very poor indeed. There is a slightly better demand for handy kind coasting boats. The rate to London is from 4s. 1½d. to 4s. 3d.; Havre, 5s. 7½d.; Ostend, 5s. 6d.; Boulogne, 5s. 1½d. per ton. The Baltic trade is very poor; £4 to £4 10s. is the nominal figure for Cronstadt; but there are literally no orders thence in the market. Copenhagen is £4 10s. per keel. There have been inquiries for gas coals for the Mediterranean ports, and freights have advanced 10s. per keel.

There is an improvement in the shipment of goods to the Continent. They are being despatched in small parcels. The chemical market is rather dull. The iron trade is without change.

Experience, tested over a long course of years, shows that there is not a more certain or safe investment in the north than gas stock. In two bad years, when trade has been deplorable, and most of the companies have made a reduction in price, when nearly all classes of limited liability companies in the district show a miserable array of empty coffers (the exceptions to this being very few), the gas companies are able to declare a pretty uniform rate of dividend, and equal to former years.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

At a special meeting of the Burntisland Town Council held on the evening of Monday, the 3rd inst., a resolution was passed to adopt the Burghs Gas Supply (Scotland) Act; and at a special meeting of the Police Commissioners of Kirkintilloch, held on Thursday evening, the following resolution was unanimously agreed to:—"That the Commissioners do now resolve that the Burghs Gas Supply (Scotland) Act, 1876, be adopted in, and applied to, the Burgh of Kirkintilloch; and, further, appoint Tuesday, the 8th of January, 1878, for holding a second special meeting to resume consideration of this resolution, all in terms of the Act." The subject will, of course, be made a test question at the election in December next.

The same subject is about to be taken up by the Police Commissioners of Lockerbie. They held a special meeting on the 3rd inst., at which some correspondence from the secretary of the gas company was submitted, regarding a misunderstanding about an alleged overcharge for gas to the commissioners. Mr. Blacklock characterized the reply from the gas company as pompous and provoking. Bailie Bryden thereupon moved that six tin paraffin lamps be provided and placed in the public lamps, to

see if it would be as cheap and effectual to the burgh to light up the streets with paraffin oil as with gas. The motion, which seems to have been regarded as a sort of revenge on the gas company, was agreed to unanimously. Bailie Bryden also gave notice of motion for next meeting —"That the Burghs (Scotland) Gas Supply Act be adopted in, and applied to, the Burgh of Lockerbie." The clerk was instructed to communicate with the town-clerks in the various towns around Lockerbie to ascertain the price of gas per 1000 cubic feet, as also the cost of lighting each public lamp during the lighting season.

The gas-meter rent question was again up for consideration at a public meeting of the gas consumers of Milngavie last Wednesday evening. It was reported that the gas company had refused to reconsider the imposition of meter-rents, and the following resolution was come to:—"While agreeing from necessity in accepting this decision in the meantime, the committee appointed at the first public meeting are requested to protest to the company, in the name of the public, against the arbitrary charge, and to express regret at the antagonistic position taken up by the gas company on the gas question."

At the ordinary meeting of the Police Commission of Dumfries, held last Friday evening, a report from the Lighting Committee was submitted, which stated that the directors of the gas company had offered to supply gas to the public lamps of Dumfries from Sept. 1, 1877, till May 1, 1878, for the sum of £400, payable one-half on the 1st of January and the other half on the 1st of May. On the recommendation of the committee the offer was accepted.

The report upon the Dumfries gas, by Mr. Wood, gas analyst, for the week ending the 8th of September, gives the average illuminating power at 20·27 standard candles, the price being 5s. 10d. per 1000 cubic feet. Mr. Wood supplements that statement by giving the illuminating power and price of gas supplied by a dozen gas companies and corporations. The lowest illuminating power after Dumfries is that of the Dundee gas, 26·63 candles, the highest being that of Aberdeen, 30·49 candles; and the price ranges from 3s. 9d. per 1000 feet at Coatbridge to 5s. at Kilmarnock.

Dr. Wallace's report on the Glasgow gas for the week ending Sept. 1 shows that, on two separate occasions, the gas at St. George's Cross testing-station was under the 25-candle standard provided for in the Glasgow Gas Act. The lowest minimum was 23·65 candles, whereas at the West Street station the minimum was 27·00 candles. The average at each of the three testing-stations now in operation was 25·37 candles at St. George's Cross, 26·78 candles at Virginia Street, and 28·03 candles at West Street.

At the monthly meeting of the Dundee Gas Commissioners, held last Wednesday, it was reported that the average illuminating power of the gas for the month of August was 26·12 standard candles.

At a meeting of the Airdrie Town Council last Thursday, the question of providing an apparatus at the police office to test the quality of the gas, to be reported upon monthly to the council, was remitted to the Gas and Lighting Committee to consider.

The directors of the Comrie Gas Company met on Friday week for the purpose of appointing a manager in the room of Mr. Napier, who left lately to undertake the management of the Crieff Gas-Works. After examining the various testimonials of the applicants, Mr. Malcolm Glen, Partick, was unanimously appointed to the management of their works.

On Wednesday last, the first general meeting of shareholders of the Penicuik Gas Company was held in Edinburgh. Mr. Birrell, chairman of the company, made a statement with reference to the new gas-works now in course of erection at Penicuik. The works are estimated to cost about £11,000, and it was reported that an arrangement had been made whereby the company would supply gas to the new military prison at Greenlaw barracks, and also at Messrs. Cowan's paper-mills. It was expected that, should the weather prove favourable, a supply of gas would be obtained by Martinmas, while, so far as the directors could judge, the works would be as favourable for gas-making as it was possible to have at the present day. Out of a list of 51 applications, Mr. M'Gillivray had been appointed manager. Messrs. James Russell and John Henderson were elected directors in room of two who retired.

Glasgow Corporation Gas Annuities were dealt in last Friday at the advanced rate of 221 for a broken lot.

At the usual meeting of the Town Council of Glasgow, held last Thursday, some discussion took place on the Gas Committee's report and statements of accounts, which were submitted at the previous meeting, and on the motion of Bailie Walls, the convener, they were adopted. It was also resolved, on the question of deposits by consumers—"That when a depositor pays his gas accounts punctually for three consecutive years in the same premises, the deposit will be returned."

The chief event in Scotland during the past week, in reference to water supply affairs, is the decision which Lord Curriehill pronounced last Tuesday in the Dundee water case. It may be remembered that Messrs. Edington and Sons, engineers and ironfounders in Glasgow, and others, sued the Dundee Water Commissioners for payment of an account amounting to over £22,738, as the balance due to them in connexion with the construction of the new works. The principal sum was challenged by the defenders, on the ground that no proper authority had been given for certain alterations and additions charged for, and because it was alleged the account was overcharged. Lord Curriehill has given decree in favour of the pursuers for £10,995, but has found neither party entitled to expenses.

The pig iron warrant market was very quiet during the past week, and on Friday the market closed—sellers, 54s. 7d. cash, and 54s. 8d. one month; buyers, 1d. per ton less.

There is a sensible improvement in the coal trade, buyers now being inclined to place some winter orders.

WAVERLEY ASSOCIATION OF GAS MANAGERS.

The Thirty-third Half-Yearly Meeting of the Members of the above Association was held at Melrose, on Wednesday last. In the unavoidable absence of Mr. Smith of Hawick, Mr. CLAZY (Kelso) was called upon to preside.

The CHAIRMAN made a few remarks on the advantages derived from such meetings as the present in bringing about a closer intimacy and kindly feeling towards each other amongst the members of such associations; and as being particularly valuable to young members, in giving them an opportunity of receiving from the older members encouragement and advice in any difficulty that might occur in the course of their experience. He also called attention to the fact of the "Waverley" being the oldest association of gas managers in existence, and the mother of all the associations of gas managers which have sprung into existence in Great Britain, America, the Continent of Europe, or anywhere else.

The SECRETARY (Mr. Robson) read the report of income and expenditure for the past half year, which showed a considerable balance in favour of the Association.

The chairman and secretary were instructed to ascertain the best way to invest the surplus funds for the benefit of the members, and to report to the next meeting, which is to be held at Kelso on the second Thursday in April, 1878.

Mr. HALL (Berwick) introduced the subject of 20-candle gas. And after a prolonged discussion, in which all the members took part, it was the unanimous opinion that, however desirable it was, on account of the increasing value of first-class parrot coal, to lower the quality of the gas supplied in North Britain, it was utterly impossible to do so without a complete alteration and enlargement of all the gas fittings at present in use in Scotland. A wish was expressed that gas companies had greater power to compel sufficient piping and other fittings to be furnished through which they were required to give a supply of gas.

On the suggestion of Mr. ROBB (Haddington), seconded by Mr. HALL (Berwick), it was unanimously agreed to send a deputation to some of the younger branches of the family. The claims of the North British and West of Scotland Associations were discussed, and it was decided that the West of Scotland should be the first to whom a deputation should be sent from this Association.

Mr. Clazy (Kelso) and Mr. Robson (Selkirk) were deputed to represent the Association at their next meeting, which takes place at Helensburgh on the 27th instant.

The business part of the programme being now finished, the members and their friends spent a short interval in surveying and admiring the lovely landscape, in the centre of which the town of Melrose lies so cosily.

Dinner was provided in the "King's Arms" Hotel, and our correspondent remarks: "Whether from accident or design I cannot tell, but, true it is, that our half-yearly meetings take places within the fishing season on the Tweed, so that by the kindness of a friend of the Association a goodly salmon graces the table at every meeting." Ample justice being done to the dinner, toast, song, and sentiment followed, and, after a couple of hours very pleasantly spent, the company separated, highly delighted with the day's proceedings.

REJECTION OF THE BURGHS (SCOTLAND) GAS SUPPLY ACT AT BANFF.

On Monday, Sept. 3, a special meeting of the Town Council of Banff was held, for the purpose of considering and resolving whether the Burghs (Scotland) Gas Supply Act, 1876, should be adopted in, and applied to, the Burgh of Banff. Provost COUTTS presided, and there were other eight members present, including three bailies, the treasurer, and the Dean of Guild.

After the TOWN-CLERK had read the notice convening the meeting,

The PROVOST said that anything which they did at that meeting did not at all fix what was subsequently to be done. It merely gave parties the opportunity of considering whether the Act should be adopted. When the meetings were called, and the new town council had come into operation, they had to say whether they would adopt the Act; and even after that, if ten or twenty persons objected, a poll had to be taken; so that the proceedings in which they were about to engage were a mere matter of form, which only enabled the community to deal with the question.

Mr. GEORGE said that, if they passed a resolution to adopt the Act, those members who supported the resolution would necessarily be held as agreeing to the ultimate confirmation of the resolution, and, therefore, they would have to consider the provisions of the Act very closely that day in order to make up their minds whether they should take any step in the matter. He had himself looked pretty closely at the Act, and had come to the opinion that it should not be adopted. He referred at some length to the powers of the commissioners charged with the adoption of the Act, and examined the provisions contained in the 21st section of the Act, after which he proceeded to say, if the present gas company should refuse to hand over their concern, he did not suppose that any one would think of establishing a second gas supply in the town. It, therefore, virtually came to be a question whether the commissioners would be prepared to take over the existing gas company's undertaking, or do nothing at all. He found that the purchase price must be paid by a capital sum of money or annuities, or by borrowing. If the sum were borrowed, the lenders of the money would have the rates as security for their capital and interest. Under section 40 it was enacted that the commissioners should, "in every year after the second year from their commencing to supply gas, set apart as a sinking-fund a sum of not less than one-fortieth part of the sums borrowed, until such sums be respectively paid." Following upon that, it was stated that the commissioners should fix the price of gas at a rate which would, "as nearly as can be estimated, raise sufficient income to discharge all the costs and expenses of, and incident to, the manufacture and distribution of the gas made, together with the interest on all money borrowed in respect of the works, and to provide the sinking-fund required by this Act, and to provide for a depreciation and renewal fund sufficient to maintain the works in perpetuity." Then again, if that should be insufficient, they fell back upon the "guarantee-rate," to be levied on property within the burgh. Further on, it was enacted that the commissioners had to produce gas of a certain pressure and quality, and if they did not produce that pressure and quality they would be liable to each consumer in a penalty of £20. It was a question whether the gas company's plant would be sufficient to enable them, in the event of their becoming suppliers, to fulfil such strict obligations. It might be a good plant for producing dividend, but would they be able to raise all the capital, and provide a sinking-fund and a depreciation-fund, without increasing the price of the gas, or falling back upon the guarantee-rate; and would they be able with that plant to produce gas of the quality specified in the Act? Until they had obtained information on those points, he thought it would be needless to incur the expense of taking any step towards the adoption of the Act. He therefore moved that the Act be not adopted. The resolution would not prevent them taking up the subject at any future time. It might be ascertained from the gas company what they would be willing to accept for their concern, and they could ascertain by the aid of gas engineers and accountants whether they would be able to satisfy the requirements of the Act of Parliament.

The PROVOST said that it did not appear to him that they should shut out the community from the opportunity of saying whether they wished to adopt the Act or not. There was no doubt that a feeling existed that the gas supply would be better in the hands of a public body than in the hands of private individuals.

Mr. WILLIAMSON concurred in the remarks made by Mr. George. The question resolved itself very much into whether or not they should take over the present gas-works. He did not see that it would be to the advantage of the community to take them over, and they could not think of starting new works.

Mr. GEORGE said that, supposing a resolution were passed at that meeting in favour of the adoption of the Act, he would vote against its confirmation, as his mind was made up as to the Act, and it seemed absurd to him to vote for the resolution.

Mr. WILLIAMSON said he would not commit himself to the adoption of the Act at any time. If they were to consider the matter at all, they must give expression to their opinion.

Bailie HOSSACK had great sympathy with the remarks made by Mr. George and Mr. Williamson. He thought they should let the matter alone. They were quite sufficiently supplied with gas by the present company. The works were well managed. They did not know where they might be landed, if they adopted the Act. It might certainly act in a detrimental way to their pockets.

The Provost hoped the council would understand that the fact of his being chairman of the present gas company, and a shareholder to a certain extent, did not influence him in any way. He repeated that it would be better that the council should consider whether they would give the community an opportunity of dealing with the Act.

Bailie Cumming considered they were bound as a council to give the community such an opportunity. Their resolution would simply be formal, so as to enable the next council to consider the matter. If they did not then pass the resolution, they could not bring it up again till next year. He moved that the Act should be adopted.

Mr. Watt was of opinion that there would not be great loss though the matter were delayed for a twelvemonth. If they represented the community, they should give their individual opinions as to what it was right to do.

Bailie Murray seconded Bailie Cumming's motion.

The Provost said that people had been knocking at his door in connexion with the matter for several years, and he had, therefore, felt it his duty to give an opportunity to the community of expressing their wishes.

Eventually the motion for not adopting the Act was carried by five votes against two.

Lynn Gas Company.—At the half-yearly meeting of this company on the 31st ult.—Mr. J. D. Thew in the chair—the report was passed, and a dividend at the rate of 5½ per cent. per annum was declared, leaving a small balance to be carried forward to next account.

Purchase of the Ilkeston Gas-Works.—At the monthly meeting of the Ilkeston Local Board, on the 4th inst., the agreement for the purchase of the undertaking of the gas company was sealed. The terms are £25,000, and a further sum, not exceeding £5000, for legal and other expenses connected with the transfer.

Belper Gas Company.—The half-yearly meeting was held on the 30th ult. —Mr. Hanson in the chair—when the usual dividend at the rate of 5 per cent. was declared. At a special meeting held immediately afterwards, it was resolved to increase the capital of the company by £2000 for the necessary extensions of plant and mains.

Quality of the Birmingham Gas.—Mr. Jackson, the corporation gas examiner, reports that during the month of August, at the four gas-making stations of the corporation, he made 20 examinations of the illuminating power of the gas supplied to the borough. The maximum light in sperm candles was 17·48; minimum, 16·20; average, 17·05. The parliamentary standard is 15 candles, with Sugg's No 1 "London" burner.

Proposed Sale of the Droitwich Gas-Works.—The Town Council of Droitwich, at their meeting on the 31st ult., resolved to apply to the Local Government Board for authority to borrow £5000, for the purpose of purchasing the undertaking of the gas company supplying the town. The company have offered to sell their works for £3675, to which sum will be added the invoice price of the coal, lime, fittings, and gas in store at the time of the completion of the transfer, and the corporation have agreed to accept these terms.

Portsmouth Water-Works Company. — The half-yearly meeting of shareholders was held on the 7th inst.—Col. Galt in the chair. In moving the adoption of the report, the chairman congratulated the shareholders on their present position, and said the directors were able to recommend a dividend of 9 per cent., which he hoped next year would be 10 per cent. He referred to the offer for a guarantee of 9 per cent. by the corporation (whose application for the purchase of the works had been refused), and said he felt sure the shareholders had no intention to sell. This was the unanimous feeling of the shareholders present. The report was adopted, and a dividend declared of 9 per cent. per annum, free of income-tax. The retiring directors were re-elected, and thanks passed to the directors for their attention to the company's interests.

Chesterfield Water-Works and Gaslight Company.— The half-yearly meeting of shareholders was held on Friday, the 31st ult.—Mr. R. T. Gratton in the chair. The report of the directors stated that the water supply had been extended to the Grassmoor district, and that the northern main from Linacre to Drone Bridge was approaching completion. In the gas department considerable progress had been made with the new retort-house and coal-stores, which were ready for roofing. The chimney-stack had been satisfactorily finished, the two boilers by Messrs. Galloway and Son were set, and the washer, scrubber, and condenser had been erected. The report of the resident engineer and manager (Mr. C. E. Jones) stated that the illuminating power of the gas had been maintained far above the parliamentary standard of 15 candles, and a greater degree of purity attained. The average illuminating power for the half year was equal to 17·21 candles. The pressure had been at all times in excess of the parliamentary requirements; sulphuretted hydrogen had been invariably absent; ammonia had averaged 0·22 grains per 100 cubic feet; and sulphur in other forms than sulphuretted hydrogen, as estimated by the Referees sulphur test, had averaged 6·90 grains per 100 cubic feet. The accounts for the half year showed a balance of net revenue amounting to £5926 19s. 8d., out of which the directors recommended the payment of the full dividends on the several classes of stocks and shares, and a bonus of 10 per cent. on the ordinary stock in respect of deficiencies in previous years, after the payment of which there remained a balance of £791 2s. 2d. to carry on to the current half year.

Wellingborough Gaslight Company, Limited.—The annual meeting was held on the 27th ult.—Mr. John Wood Sharman presiding. The report of the Committee of Management stated that the business of the company continued to increase, and that it had yielded a profit of £1807 7s. 8d. on the year's working. Out of this amount it was recommended that a dividend be paid at the rate of 10 per cent. on the capital of the company, and that the balance be carried forward to the credit of the current year. The committee proposed to reduce the charge for gas 4d. per 1000 feet from the 1st of July last. As the town continued to increase, it became necessary annually to extend the works. Since the principal alterations in 1872-3 (which cost £7000), it had been found necessary to expend over £300 a year upon this account, by which the balance of the capital then raised had been reduced to £400. A further enlargement of the works at considerable cost would soon be indispensable—it was consequently the duty and interest of the company to make arrangements for an increase of the capital by the issue of new shares. The report and accounts were adopted, the chairman and auditor were re-elected, and thanks were unanimously passed to the Committee of Management, and to the officers of the company. The meeting was then made special, for the purpose of altering the time for holding future annual meetings of shareholders, and the mode of electing the members of the committee, filling up vacancies, &c. The following resolution was also adopted:—"That the capital of the company be increased by the issue of two new shares of £25 each, to be offered, sold, and disposed of in accordance with the 38th clause of the deed of settlement; and also by the issue of 500 new shares of £25 each, to be called B shares, which shall be allotted *pro ratâ* amongst the present proprietors. And that the sum of £1500, undivided profits of the company, be distributed in such manner that £3 per share on each of the said 500 B shares be considered as paid up on issue, and that a further sum of £2 per share on the said B shares be called up and made payable on the 1st day of October next."

Weston-super-Mare Water-Works Company. — On the 26th ult. a special meeting of the Weston Town Commissioners was held—Mr. Knight in the chair—for the purpose of considering the question of the proposed purchase of the undertaking of the water company. The chairman stated that, in pursuance of a resolution passed at the meeting of the commissioners on the 15th of August, he and the clerk had been to London and waited on the chairman of the water-works company, and Mr. Julian Hill, the managing director, and had succeeded in purchasing the works, machinery, plant, &c., for the sum of £2600 per annum in perpetuity, secured on the town rates. The clerk having read over the heads of the agreement entered into, the following resolution was adopted:—"That the clerk be instructed to take the necessary steps for obtaining an Act of Parliament for the purpose of carrying out the purchase of the Weston-super-Mare Water-Works on the terms contained in the provisional contract as now read." Votes of thanks were passed to the chairman and clerk for the manner in which they had discharged the duties entrusted to them.

Stafford Water Supply.—At the meeting of the Stafford Town Council on the 4th inst., a report was received from Mr. Dennis, the corporation engineer, with respect to the boring operation for water on the common. Mr. Dennis stated that the bore-hole on the 31st ult. had reached a depth of 400 feet from the surface, showing a progress during the past month of 127 feet. The depth gave an average of 5 feet per day, or, deducting the time in fixing the 9-inch lining tubes in the bore-hole, and in making good some slight damage sustained by the core tube, an average of 7 feet 6 inches per day for the time actually employed in boring. As one-half of the time in which Mr. Richardson had contracted to carry the bore-hole to a depth of 1000 feet had now expired, it would appear probable that his undertaking in this respect would fail of accomplishment. In justice to Mr. Richardson, however, it should be stated that his progress had lately been less rapid than it might otherwise have been in consequence of the efforts he had made (and was still making) to carry down the 9-inch tubes to a greater depth than was at first thought practicable. At the present time about 263 feet of 9-inch lining tubes had been fixed in the bore-hole. Contrary to expectation, salt rock had been encountered in the bore-hole, this time at a depth of about 283 feet from the surface, or 20 feet below the salt deposits already reported. The boring was still in the Keuper marls, but a more favourable character was being assumed, and it became a matter of great moment to extend the 9-inch tubes to the present depth of the bore-hole. The report was received and adopted.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

3307.—Hadfield, R., Sheffield, "Improvements in gas checks." Aug. 30, 1877.

3330.—Foulis, W., Glasgow, "New or improved apparatus for lighting and extinguishing gas-lamps, part or parts thereof acting as governors for lamps or for analogous purposes." Sept. 1, 1877.

3333.—Symons, W. T., Wednesbury, Stafford, "A fender gas-stove." Sept. 1, 1877.

3341.—Alexander, E. P., Southampton Buildings, London, "Improvements in or relating to apparatus for heating by gas." A communication. Sept. 3, 1877.

3355.—Berlon, H., Fürstenhagen, I., and Wildt, H., Bradford, York, "Improvements in filters and the fittings connected therewith." Sept. 4, 1877.

3356.—Harding, T. R. and T. W., Leeds, York, "Improvements in the manufacture of drills, rymers, screwing taps, and other similar articles." Sept. 4, 1877.

3364.—Johnson, J. H., Lincoln's Inn Fields, London, "Improvements in liquid meters." A communication. Sept. 4, 1877.

3368.—Jagger, W., Horsforth, York, "A new or improved self-acting metallic packing for parts of steam, air, gas, or other fluid pressure engines, or for pumps, or other machinery or apparatus in which packing is required." Sept. 5, 1877.

3397.—Dennert, J. C., Altona, Germany, "An improved water-meter and water power motor, valve motion, and regulator." Sept. 6, 1877.

3400.—Cozza, A., Orvietto, Italy, "An improved construction of tube coupling." Sept. 6, 1877.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

1047.—Gubbins, R. R., and Whitestone, J., Upper Thames Street, London, "Improvements in valves, and in the machinery used for grinding the seats of such valves and other articles requiring such an operation." March 15, 1877.

1104.—Firmin, W., Hackney Road, London, "Improvements in ball-valves or ball-cocks." March 20, 1877.

1272.—Pawson, W., Grantham, Lincoln, "Improvements in valve and ball-cocks or taps." March 31, 1877.

1547.—Janig, H., Sherwood, Nottingham, "Improvements in machinery for cooling liquids, vapours, and gases, and for condensing steam and vapours." April 20, 1877.

2552.—Lake, W. R., Southampton Buildings, London, "Improvements in apparatus for heating water by gas." A communication. July 3, 1877.

2585.—Prosser, W., Chelsea, and Moore, W. E., Brixton Rise, London, "Improvements in the construction and arrangement of lamps or apparatus adapted to the electric light, parts of which are applicable to other lights." July 5, 1877.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

2631.—Budenberg, A., "Improvements in illuminated pressure and vacuum gauges." July 28, 1874.

2666.—Mushet, R. F., "Improvements in the method of raising water and other fluids, and in the construction and arrangement of apparatus for that purpose." July 31, 1874.

2698.—Clayden, S., "A new or improved compound regulating governor gas-generator." Aug. 4, 1874.

2711.—Else, G. E., "Improvements in valves or cocks." Aug. 5, 1874.

2742.—Payton, W., "Improvements in valves for controlling the delivery of water or other liquids from or into pipes, cisterns, tanks, or other vessels or apparatus." Aug. 7, 1874.

2802.—Henry, M., "Improvements in the method of and apparatus for obtaining ammonia from waste products and other matters." Aug. 13, 1874.

2815.—Smith, W. H., "Improvements in treating metals and their alloys by subjecting them to the action of liquids, gases, vapours, and in apparatus employed therein, and for the manufacture of gas for illuminating and heating purposes." Aug. 15, 1874.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

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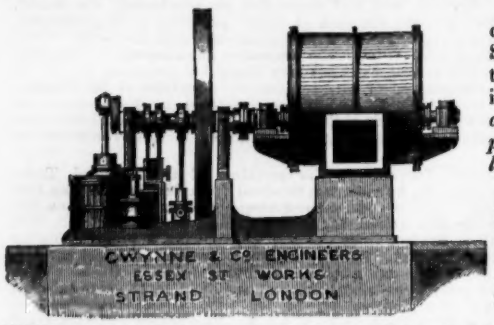
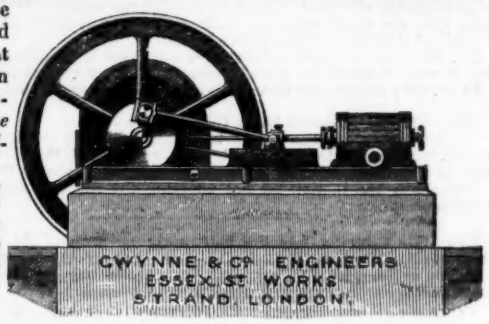


EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



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Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure. Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

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May 30. 1877.

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WANTED, two good, steady, respectable sober men as STOKERS, to take turns at night and day work. Wages 25s. per week. Testimonials or satisfactory references required.

Apply to Mr. RICHARD HOLMES, Secretary, Arundel.

WANTED, by a practical Man, a re-engagement as MANAGER of a Gas-Works. Thoroughly efficient in every department. Good testimonials and references.

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TO GAS-FITTERS.

WANTED, a Fitter for a medium-sized town in the West Indies. He must be well up both in compo' and iron-pipe fittings. Good character indispensable.

Apply, with testimonials, to Ventura and Cabrera, 18, Coleman Street, LONDON, E.C.

GOUROCK GAS COMPANY.

WANTED, an active young Man as INSPECTOR of Meters and COLLECTOR, and to make himself generally useful. One with some knowledge of gas-fitting preferred. Salary and commission about £70 per annum. Security required.

Applications, with references, to be forwarded, addressed to the SECRETARY, on or before Wednesday, the 19th curt., Gas Office, GOUROCK.

TRURO GAS COMPANY.

WANTED, by the above Company, a thoroughly practical Man as a GAS-FITTER. One who understands bronzing and lacquering would be preferred.

Applications, enclosing testimonials, with references, and stating wages expected, to be addressed to the Secretary, Mr. J. HAMILTON.

Dated, Truro, Aug. 30, 1877.

RIPON CITY GAS-WORKS.

MANAGER WANTED.

THE Local Authority for this City wish to engage a thoroughly competent and experienced MANAGER for their Gas-Works, at a salary beginning at £100 per annum, with a good house and a garden rent free, and coals, gas, and water; and the parochial and Local Board's rates will be provided, or paid for, for him.

Applications, in the candidate's own writing, marked on the outside, "Gas-Works Manager," and stating age and previous employment, with testimonials as to character and fitness for the appointment, are to be sent in, on or before Tuesday, the 18th day of September inst., to me, at my Offices in Ripon, where also any further information required may be obtained.

By order,
R. W. NICHOLSON, Town-Clerk, and Clerk to the said Local Authority.

Ripon, Sept. 6, 1877.

WANTED, the Address of Gas Officers who have not received a Copy of the New Edition of PAMPHLET for GAS COMPANIES to distribute to their Gas Consumers—"Cooking and Heating by Gas." A Copy will be sent free—extra Copies by post Threepence—direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

FOR SALE—A Gasholder, 30 feet by 12 feet; also Hydraulic Condenser, Purifier, &c., all in good order.

For further particulars, apply to JAMES NORMAND AND SONS, Dysart, Fifeshire.

FOR SALE—One Exhauster by Jones, of Birmingham, capacity 25,000 feet per hour, with bye-pass, 12-in. inlet and outlet pipes and valves complete, in first-class working condition, price £40; also one Exhauster Regulator, with chain and weights complete, price £5.

Apply to CLAPHAM BROS., Ironfounders, &c., Keighley, YORKS.

TO TAR DISTILLERS AND MANUFACTURING CHEMISTS.

THE Redditch Town and District Gas Company, Limited, invite TENDERS for the TAR and AMMONIACAL LIQUOR to be produced at their Works for the ensuing Three years.

Tenders to be sent in on or before Saturday, the 22nd inst.

By order,
T. LAYTON, Secretary and Manager.

THE Directors of the Horsham Gas Company, Limited, invite TENDERS for their surplus TAR from the present time till Michaelmas, 1878.

The Contractor to provide barrels when required, and to pay all railway charges.

The Company to pay all charges between their works and the Horsham Railway Station.

Sealed tenders, endorsed "Tender for Tar," to be sent to the undersigned on or before the 15th inst.

The tenders to state the price offered, per American oil barrel, not exceeding 40 gallons.

The quantity for disposal is expected to be about 400 barrels.

Tenders are also invited for AMMONIACAL LIQUOR on similiar terms.

All payments to be made quarterly.

ROBERT SHEPPARD, Secretary.

PHŒNIX GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the ADJOURNED HALF-YEARLY GENERAL MEETING of PROPRIETORS holding, previous to the 30th of June last, £300 paid-up capital and upwards in the said Company, will be held, pursuant to the Act of Incorporation, on WEDNESDAY, the 3rd of October, at Two o'clock precisely, at the Bridge House Hotel, in the Borough of Southwark, for the purpose of declaring Dividends to the 30th of June last, to make a call upon the new stock payable on the 1st of November next, and on other business.

The Transfer Books will be closed on and after the 12th of September, and opened on the 4th of October.

By order of the Court of Directors,
ISAAC ADOLPHUS CROOKENDEN, Secretary.

70, Bankside, London, S.E., Sept. 29, 1877.

GASHOLDER FOR SALE.

ONE Telescopic Gasholder, 70 feet by 20 feet, complete, with cast-iron tank, columns, girders, and inlet and outlet pipes, valves, &c., of modern construction. In first-class condition, and made by Messrs. Piggott and Co., of Birmingham.

To be seen at work at the Gas-Works, Birkenhead.

Cause of removal to make room for extensions.

To be sold a bargain, taken down, and re-erected ready for work.

For particulars, apply to MESSRS. ASHMORE AND WHILE, STOCKTON-ON-TEES, or to view to Mr. CALLOW, Gas Engineer, BIRKENHEAD.

THE LONDON GASLIGHT COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY MEETING of the PROPRIETORS of the Company will be held at the Freemasons Tavern, Great Queen Street, Lincoln's Inn Fields, on WEDNESDAY, the 3rd day of October, 1877, at Twelve o'clock precisely.

The Transfer Books will be closed on Tuesday, the 18th day of September, until after the meeting.

By order of the Board,
A. J. DOVE, Secretary.

Dated this 10th day of September, 1877.

MEMORANDUM.—Proprietors must hold capital stocks or shares paid up to the amount of £250, to be qualified to attend this meeting.

SOUTH METROPOLITAN GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the PROPRIETORS of this Company will be held at the Bridge House Hotel, London Bridge, S.E., on TUESDAY, the 2nd day of October next, at Two o'clock in the afternoon precisely, to receive the Directors Report and the Accounts of the Company for the half year ended the 30th of June last, and to declare a Dividend for the same period.

The Transfer Books will be closed from the 18th day of September until after the Meeting.

By order,
GEORGE LIVESEY, Secretary and Engineer.

589, Old Kent Road, S.E., Sept. 3, 1877.

THE BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is hereby given that the HALF-YEARLY GENERAL MEETING of the PROPRIETORS of this Company will be held at this Office, on WEDNESDAY, the 26th inst., at One o'clock precisely, to transact the usual business, to declare the Dividend for the half year ending the 30th of June last, and to elect two Directors and one Auditor, in the place of those who go out by rotation, but who are eligible to be re-elected.

Notice is hereby also given that the Transfer Books of the Company will be closed on the 14th, and re-opened on the 27th inst.

By order of the Court of Directors,
FREDERIC LANE LINGING, Secretary.

Chief Office, No. 11, George Yard, Lombard Street, London, E.C., Sept. 5, 1877.

P.S.—Any qualified proprietor intending to become a candidate for either of the above-mentioned offices is required to signify the same by a written notice under his hand, to be left at the Office of the Company twelve days at least previous to the 25th inst.

TO BE SOLD CHEAP, a Horizontal STEAM-ENGINE of six-horse power, and Cornish Boiler 4 ft. 9 in. diameter and 8 ft. long, either together or separately.

The above have not been fixed since they came from the fitter's shop.

Apply to Mr. JOHN BUDDEN, Manager, Gas-Works, Poole, DORSET.

Now ready, price 7s., by Post 7s. 3d.,
A SECOND EDITION (fcap. 8vo., morocco gilt)
OF
THE GAS MANAGER'S HANDBOOK,
BY THOMAS NEWBIGGING, A.I.C.E.

WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

BLACKPOOL CORPORATION GAS-WORKS.

THE Gas Committee are prepared to receive TENDERS for—

No. 1 Contract.—The erection of a NEW RETORT-HOUSE, 140 feet by 60 feet.

No. 2 Contract.—Wrought-Iron ROOF for the above.

Plans and specifications may be seen at the Office of the undersigned.

Tenders, properly endorsed, to be addressed to the Chairman of the Gas Committee, and sent in by the 25th of September.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
JOHN CREW, Engineer and Manager.
Sept. 7, 1877.

Now ready, price One Shilling, No. 10 *(to be continued Monthly) of*

A TREATISE ON THE SCIENCE & PRACTICE
OF THE
Manufacture and Distribution
OF
COAL GAS.

LONDON: WILLIAM B. KING, 11, BOLT COURT, FLEET STREET,
OR OF ANY BOOKSELLER IN TOWN OR COUNTRY.

Now ready.
THE GAS & WATER COMPANIES DIRECTORY
FOR THE YEAR 1877,
EDITED BY
CHARLES W. HASTINGS,
8, BUCKINGHAM STREET, ADELPHI, LONDON, W.C.
THIS WORK IS UNDER THE PATRONAGE OF ALL THE LEADING GAS & WATER ENGINEERS AND SECRETARIES OF THE METROPOLITAN & PROVINCIAL COMPANIES.
Price 5s. in Cloth Covers; by post, 5s. 2d. | Price 3s. 6d. in Paper Covers; by post, 3s. 8d.
PUBLISHED BY MESSRS. MARCUS WARD & CO., OF LONDON AND BELFAST.

JOHN HALL AND CO., STOURBRIDGE,
Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

JAMES MILNE & SON,
GAS ENGINEERS,
Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,
EDINBURGH, AND
2, KING EDWARD STREET,
NEWGATE STREET, LONDON.
Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,
And every description of Gas-Fittings and Gas Apparatus.

J. T. B. PORTER & CO.,
GAS ENGINEERS & MANUFACTURERS,
IRONFOUNDERS AND CONTRACTORS,
GOWTS BRIDGE WORKS,
LINCOLN.

LONDON OFFICES: 1, WESTMINSTER CHAMBERS, S.W.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.
REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—All Communications to be addressed to the FIRM ONLY.

THE Gas Committee of the Leeds Corporation are prepared to receive TENDERS for the supply of Wrought-Iron TUBES, for a period of Twelve months.

Sample bundles of three-quarter inch to be sent to Mr. Woodall, Gas-Works, Meadow Lane, not later than Monday, the 17th inst.

Tenders to be addressed to the Chairman of the Gas Committee, Town-Clerk's Office, not later than Wednesday, the 19th inst., endorsed "Tender for Tubes."

The lowest or any tender will not necessarily be accepted.

By order,
C. A. CURWOOD, Town-Clerk.
Sept. 7, 1877.

LEEDS CORPORATION GAS-WORKS.

THE Gas Committee of the Corporation are prepared to receive TENDERS for the supply of Turned and Bored and other Pipes, Bends, Tees, Syphon-Wells, and other Irregular Pipes that may be required during the next Twelve months. Price per ton to be quoted, delivered at the Gas-Works, Leeds.

Each pipe to be tested at a pressure of 60 lbs. to the square inch before leaving the manufactory.

Specification to be had on application to Mr. H. Woodall, Engineer.

Bore.	Weight per Yard.
24 inches.	650 lbs.
20 "	500 "
16 "	340 "
14 "	250 "
12 "	208 "
10 "	168 "
8 "	140 "
6 "	89 "
4 "	50 "
3 "	34 "

Tenders to be sent to my Office not later than Wednesday, the 19th inst., addressed to the Chairman of the Gas Committee, Town-Clerk's Office, Town-Hall, and endorsed "Tender for Pipes."

The lowest or any tender will not necessarily be accepted.

By order,
C. A. CURWOOD, Town-Clerk.
Leeds, Sept. 7, 1877.

LEEDS CORPORATION GAS-WORKS.

THE Gas Committee of the Corporation are ready to receive TENDERS for the supply of Retort Mouthpieces, Stand-Pipes, Door-Frames, Special Bends, Tees, Flange-Pipes, &c., that may be required during the next Twelve months. Price per cwt. to be quoted, delivered at the Gas-Works, Leeds.

Further particulars may be had on application to Mr. Woodall, the Engineer, at the Gas-Works, Meadow Lane.

Tenders to be sent to my Office not later than Wednesday, the 19th inst., addressed to the Chairman of the Gas Committee, Town-Clerk's Office, Town-Hall, and endorsed "Tender for Castings."

The lowest or any tender will not necessarily be accepted.

By order,
C. A CURWOOD, Town-Clerk.
Leeds, Sept. 7, 1877.

THE Gas Committee of the Leeds Corporation are prepared to receive TENDERS for the supply of 150 Wrought-Iron LIDS for Retort Mouthpieces, 18 in. by 15 in., weighing about 40 lbs.

Samples may be seen on application at the Gas-Works, Meadow Lane.

Tenders will be received, addressed to the Chairman of the Gas Committee, Town-Clerk's Office, Town-Hall, and endorsed "Tender for Wrought-Iron Retort-Lids," not later than Wednesday, the 19th inst.

The Committee do not bind themselves to accept the lowest or any tender.

C. A. CURWOOD, Town-Clerk.
Sept. 7, 1877.

THE Gas Committee of the Leeds Corporation are prepared to receive TENDERS for the supply of 640 WOOD GRIDS for Purifiers, 3 ft. 9 in. long by 2 ft. 2 in. thick, of Red Deal throughout, with Parallel Bars ¼ in. wide and ⅝ in. spaces, to be framed with 2 in. by 1½ in. Red Deal, with three ⅝-in. Iron Bolts to each Grid.

Sample may be seen on application at the Gas-Works, Meadow Lane.

Tenders will be received, addressed to the Chairman of the Gas Committee, Town-Clerk's Office, Town-Hall, and endorsed "Tender for Wood Grids," not later than Wednesday, the 19th inst.

The Committee do not bind themselves to accept the lowest or any tender.

C. A. CURWOOD, Town-Clerk,
Sept. 7, 1877.

THE Gas Committee of the Leeds Corporation are prepared to receive TENDERS for the supply of Brass MAIN-COCKS, for

¾-in. iron, with cap and lining for ½-in. lead.
¾-in. " " " ¾-in. "
The above with thumb plugs.
1-in. iron, with cap and lining for ¾-in. lead.
1-in. " " " 1-in. "
With square-headed plugs for loose keys.

Samples may be seen on application to Mr. Woodall, Gas-Works, Meadow Lane.

Tenders will be received, addressed to the Chairman of the Gas Committee, Town-Clerk's Office, Town-Hall, and endorsed "Tender for Brass Main-Cocks," not later than Wednesday, the 19th inst.

The Committee do not bind themselves to accept the lowest or any tender.

C. A. CURWOOD, Town-Clerk.
Sept. 7, 1877.

THE Gas Committee of the Leeds Corporation are prepared to receive OFFERS for about 400 tons of old Cast and Wrought IRON; also for One ton of old BRASS.

The above may be seen on application at the Gas-Works, Meadow Lane.

Offers will be received, addressed to the Chairman of the Gas Committee, Town-Clerk's Office, Town-Hall, and endorsed "Offers for old Iron or old Brass" respectively, not later than Wednesday, the 19th inst.

The Committee do not bind themselves to accept the highest or any offer.

C. A. CURWOOD, Town-Clerk.
Sept. 7, 1877.

GAS PLANT FOR SALE, suitable for Small Works:—
Seventeen 4-inch and 3-inch H-Pipes.
Eighteen 15-inch Circular Mouthpieces.
A 6-inch Governor.
A Station-Meter, to pass 6000 cubic feet per hour.
Scrubber and Washer combined; very good.
Vertical Condenser; very good.
Seven 7-feet lengths, 12-inch D-shaped Hydraulic Main.
Two Gasholders, each capable of holding 15,000 cubic feet.
Apply to the ENGINEER, Phœnix Gas Company, GREENWICH.

TO COAL MASTERS AND COAL AGENTS.
THE Directors of the Dumfries Gaslight Company are prepared to receive TENDERS for a supply of COALS, from 1000 to 4000 Tons, to be delivered free at the Dumfries Station as required by the Manager.
Analysis to show at least 27 candles, combined with good Coke.
Tenders to be addressed to Mr. MALAM, Gas Manager Dumfries, on or before the 15th current.
Gas-Works, Dumfries, Sept. 1, 1877.

NOTICE.
MESSRS. THOMAS DOCWRA & SON, Contractors, Balls Pond Road, hereby give notice that they have no business connexion with any other person of the same name.

T. NEWBIGGING,
CONSULTING GAS ENGINEER,
5, NORFOLK STREET, MANCHESTER.

HENRY LYON,
ENGINEER,
AND
CONSULTING GAS ENGINEER,
BARTON HOUSE, opposite BARTON ARCADE,
DEANSGATE, MANCHESTER.

ALFRED LASS,
SPECIAL ACCOUNTANT FOR GAS COMPANIES,
30, GRACECHURCH STREET, LONDON.
Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.
The Forms of Account, which have been specially designed by A. L. to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.
The above forms are registered.
Water Companies Accounts also prepared and adjusted.
CONSULTATIONS.

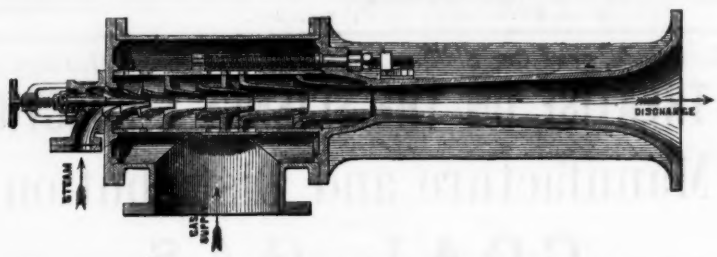
GARSIDE'S IMPROVED MAIN DRILLING CLIP.
No. 1 takes from 2-in. to 6-in. Mains.
No. 2 takes from 6-in. to 12-in. Mains.
GARSIDE'S REGISTERED TUBE-VICE takes ¾ brass to a 2-in. Socket.
May be had direct from the maker, SAMUEL GARSIDE, Gateheld Iron-Works, ASHTON-UNDER-LYNE.

BOUCK & CO., LIMITED,
TAR DISTILLERS & MANUFACTURING CHEMISTS,
MILES PLATTING, MANCHESTER.
BUYERS OF COAL TAR,
And Crude Products therefrom,
AMMONIACAL LIQUOR, &c.

HEBBURN MAIN GAS COALS.
T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14¼-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."
THE TYNE COAL COMPANY, LIMITED, OWNERS.
W. RICHARDSON, Fitter,
29, QUAYSIDE, NEWCASTLE-ON-TYNE.

JOHN ROMANS, C.E., F.G.S.E.,
CONSULTING GAS ENGINEER
AND
CANNEL COAL FACTOR,
30, St. Andrew Square, EDINBURGH.
Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.
GAS-WORKS TAKEN ON LEASE.
Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.
ANALYSIS AND PRICES FORWARDED ON APPLICATION.

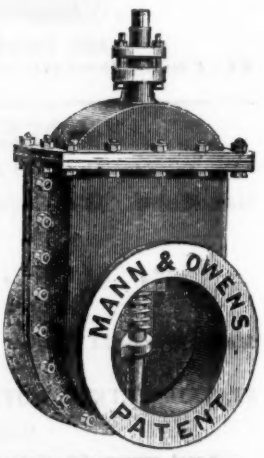
PATENT HYDRAULIC LIFTS, CRANES, HOISTS,
Suitable for Lifting Purifier-Covers, &c.
S. CLAYTON & CO., BRADFORD, YORKS.



KÖRTING'S STEAM-JET GAS-EXHAUSTER.
IMPROVED CLELAND'S PATENT.
UPWARDS OF 250 IN USE.
CLELAND'S PATENT CONDENSER AND STEAM SCRUBBER.
FOR PARTICULARS, APPLY TO
KÖRTING BROS.,
17, LANCASTER AVENUE, MANCHESTER,
OR TO
GERALD J. TUPP, 8, John Street, Adelphi, W.C.,
LONDON,
SOLE AGENT FOR ENGLAND AND WALES.

MANN & OWENS' PATENT GAS-VALVE.

EVERY VALVE WARRANTED TO BE PERFECTLY SOUND AND GAS-TIGHT.



VALVE, with Indicator for Above Ground. UNDERGROUND VALVE.

The advantages of this Patent Valve over all others yet introduced are, that it is always as tight as the best wedge or spring valve, without the possibility of setting fast or becoming suddenly leaky. The surfaces not being in contact during the operation of opening or closing, leakage through wear and tear is avoided.
The Gas Engineer will not fail to see the importance of such a valve in connexion with his purifying apparatus, particularly in the case of large sizes.
The slide being operated either by a screw and nut, or by a pinion and rack, a cam bearing upon a plane, cast on the back of the Valve, forces it against the face, and renders the escape of gas an impossibility. By a slight turn of the pinion or screw, the slide is released, and brought away from the face, by which means friction is avoided, and the only force required to open the Valve is that due to its own weight.

SOLE MANUFACTURERS:
S. OWENS AND CO.,
HYDRAULIC AND GENERAL ENGINEERS,
WHITEFRIARS STREET, LONDON, E.C.
PRICES, SIZES, AND FULL PARTICULARS ON APPLICATION.

E. & W. H. HALEY,

General Ironfounders and Makers

OF

CAST-IRON GAS AND WATER PIPES.

Sizes 1¼ to 15 inches.

LISTER HILLS FOUNDRY, BRADFORD, YORKSHIRE.

J. EDMUNDSON & CO.,

19, GREAT GEORGE STREET, WESTMINSTER,
LONDON, S.W.,

MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS.

CONTRACTORS FOR THE

ERECTION OF GAS-WORKS, GAS-FITTINGS, &c.,

FOR TOWNS, COUNTRY MANSIONS, &c.

Estimates given free of Charge.

GAS PURIFICATION.

BAILES & HALLSWORTH,

CONTRACTORS FOR THE

PURIFICATION OF COAL GAS,

BY THEIR

PATENT OXIDE OF IRON COMPOUND.

The material is in use at most of the principal Gas-Works in Yorkshire and elsewhere. It contains considerably less moisture than natural Oxide of Iron. It is much cheaper and more efficient as a purifying agent.

B. & H. are purchasers of Spent Oxide, or will take Spent in exchange for New Material.

FOR SAMPLES AND TERMS, ADDRESS—

BAILES & HALLSWORTH, COPPERAS WORKS, ARMLEY, LEEDS.

J. & J. BRADDOCK,

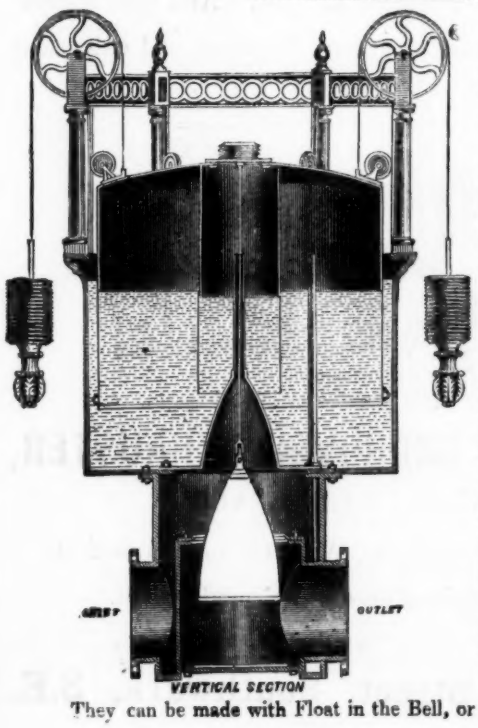
GLOBE METER-WORKS,

OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

CATHELS'S Improved Retort-Settings. Guaranteed to heat and wear well, with great economy of Fuel.

Coloured lithograph copies of Working Drawings of Beds of One to Seven Retorts (so clearly arranged and fully shown as to be easily understood by any retort setter or bricklayer) having been made of these valuable settings, they can now be supplied with detailed Specification immediately on receipt of orders.

Apply to Mr. THOS. NEWBIGGING, Consulting Gas Engineer, 5, Norfolk Street, MANCHESTER.

PATENT FUEL AND LIME FOR PURIFYING FROM FOUL LIME.

By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.

Licences to work the invention will be granted to Gas Companies on very reasonable terms.

For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.

The adoption of the above invention, without a licence from the Patentee, will be an infringement of the patent, and will subject the person or company guilty of such infringement to legal process.

ADDISON POTTER,

WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of

CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c., &c.,

SCOTSWOOD FIRE-BRICK WORKS,
SCOTSWOOD-ON-TYNE.

GAS COMPANIES AND LOCAL BOARDS Requiring New Street-Lamps are recommended

KEEN'S PATENT DOUBLE-CLIP STREET-LAMP.

A great improvement on the old-fashioned 14-in. Lamps.

They have been sold to various Gas-Works throughout the country and abroad, and the highest satisfactory testimonials are given as to their superiority.

For particulars of price, &c., apply to

WILLIAM KEEN, Sole Proprietor and Manufacturer, Robertson Street, HASTINGS.

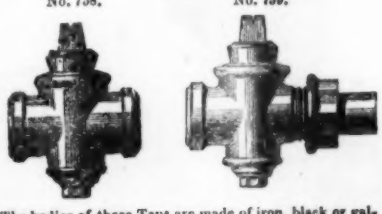
LAMBERT'S

CAST-IRON GAS-MAIN COCKS,

WITH PATENT WHITE METAL PLUGS.

TRADE (L) MARK.

No. 758. No. 759.



The bodies of these Taps are made of iron, black or galvanized, and the plugs of patent metal. They are warranted not to set fast or corrode, as do Iron or Brass Cocks; will always work easily; are strong, well made, durable; of little or no intrinsic value, and therefore not likely to be stolen; and the prices as stated below are (especially upon the larger sizes) fully 50 per cent. less than Brass Cocks.

	½	¾	1	1¼	1½	2-inch.
No. 758, with inside screws for iron pipe, black	2/0	3/0	4/4	6/6	7/6	12/0 each.
No. 759, with union on one end screwed inside for iron pipe, black	2/9	3/10	5/4	8/0	9/0	15/6 each.
Nos. 758 and 759, galvanized	0/3	0/4	0/6	0/8	0/10	1/4 extra.

MANUFACTORY:

SHORT STREET, LAMBETH, LONDON.

THE WIGAN COAL & IRON COMPANY,
LIMITED.

DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN;

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

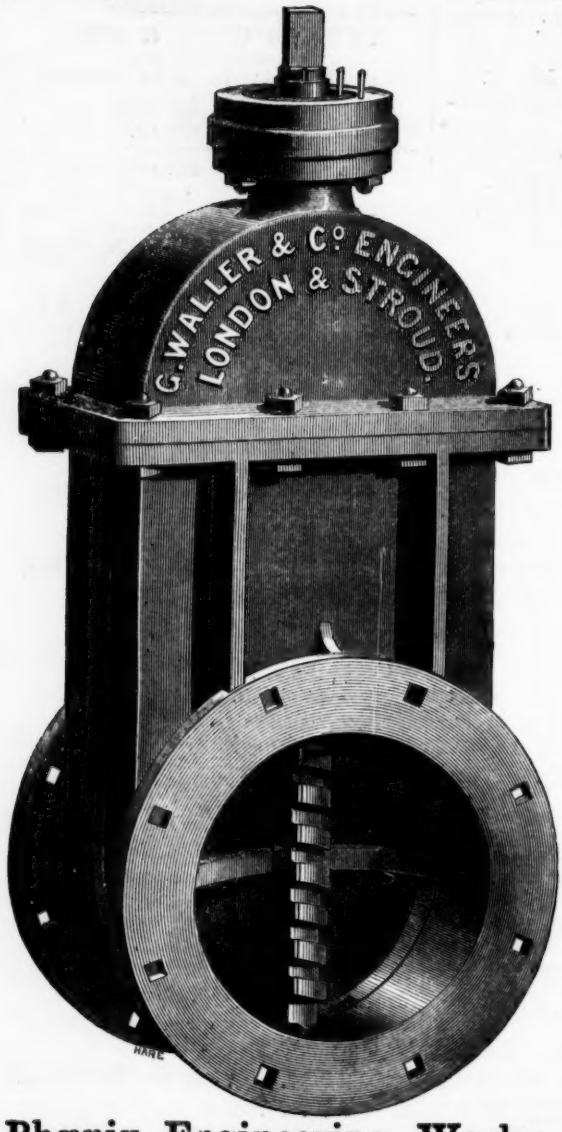
CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

GEORGE WALLER & CO.,

GAS AND HYDRAULIC ENGINEERS.

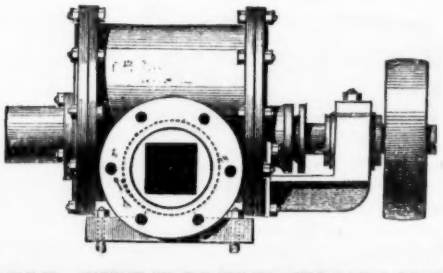


IMPROVED INDEX GAS-VALVE.

These Valves are constructed with Circular Wedged Backs, with the body *in one piece*, and are proved on both sides to 30 lbs. per square inch.

One man can open the largest Valve without gearing, and there are studs on the top of index which can readily be felt in the dark, to ascertain if the Valve is open or shut.

A large stock always on hand. Also good second-hand ones, removed during alterations and extensions of Gas-Works.



BEALE'S IMPROVED EXHAUSTER,

WITH OUTER BEARING.

Specially made by G. W. & Co. to supersede the old style of driving by counter-shaft.

Phœnix Engineering Works, Holland Street, Southwark, S.E.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD,

MANUFACTURERS OF

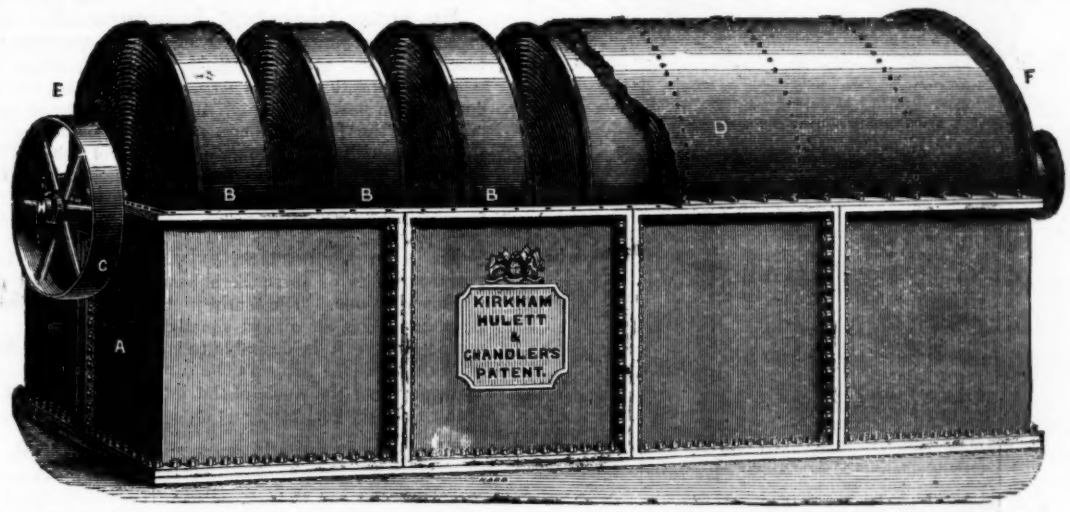
IMPROVED CENTRE-VALVES,

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

STANDARD WASHER AND SCRUBBER.



The advantages of the Apparatus will doubtless be understood by those interested in gas manufacture.

The principal points of any Apparatus for the extraction of ammonia may be summarily stated as follows: —

1. **A large amount of Surface is desirable.**
2. **Such Surface should be always effectually Wetted.**
3. **The Surfaces or Scrubbing Material should cause no Pressure.**
4. **The Gas should meet various strength Liquors on its course.**
5. **However small the quantity of Water used, it ought to operate over the whole Surface.**
6. **Changing Scrubbing Material is both Objectionable and Expensive.**
7. **Economy both as to Space occupied and Cost of Apparatus is an important item.**

All these requisitions are supplied by the above Apparatus, of which the following is an explanation:—

A is a cast-iron tank, formed into several separate water-tight compartments.

B B B volutes of sheet iron fitted to the centre shaft, which is driven by the pulley, C, and causing the said volutes to revolve each in a separate compartment filled with water or other fluid.

D, the cover, has partitions fitted into it corresponding with those in the tank, sufficient space being left between the top of the partition in the tank and the lower edge of that in the cover, to allow the gas a free passage through the first volute to the second, and so on to the third, fourth, &c.

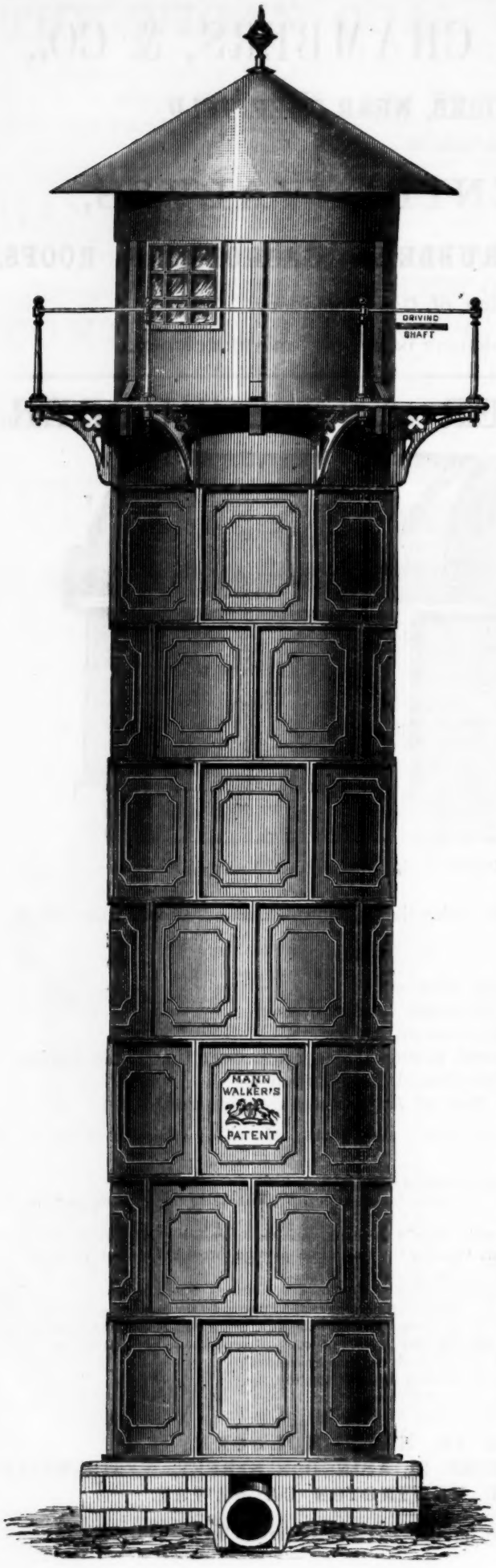
The action is as follows:—The crude gas entering at E is partly washed in the first compartment, which becomes 10 or 12 oz. liquor, or stronger if required, according to the quantity allowed to enter per ton; the gas then passes to the second, where the liquor is of a less strength; thence into a weaker liquor, as it passes from one compartment to the other, finishing at the last compartment or outlet, F, with clean water, which is constantly flowing and running over from one compartment to another, until it reaches the last space, from which it flows from the outlet-pipe into the well or tank ready for sale or removal.

Taps are inserted in each compartment for the convenience of drawing liquor for testing, &c.

Applications as to Cost, &c., may be obtained of either

Mr. D. HULETT, 55 & 56, HIGH HOLBORN;
Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER;
Or Messrs. CHANDLER, 104, NEWINGTON CAUSEWAY.

Inquirers will please state their Maximum Day Make.



C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im-portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, re-quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

TO GAS COMPANIES AND THE TRADE.

J. DEFRIES & SONS,

MANUFACTURERS OF

CRYSTAL, BRONZED, & ORMOLU CHANDELIERS, IMPROVED CRYSTAL STAR & SUN LIGHTS, VESTIBULE LAMPS, AND THE PATENT CRYSTAL ILLUMINATION.

A LARGE STOCK ALWAYS IN HAND OF

IRON, BRASS, COMPOSITE, AND LEAD TUBES, FOR GAS AND WATER,

AND EVERY DESCRIPTION OF

GAS AND WATER FITTINGS.

THE PATENT DRY AND WET METER, WITH THE LATEST IMPROVEMENTS.

STREET LAMPS AND COLUMNS IN GREAT VARIETY.

WORKS: LONDON AND BIRMINGHAM.

GAS MOONS,
Cut and Engraved, of the newest designs

GAS REFLECTORS
In Silver and Glass

GAS NIBS
AND
BURNERS
Of every description.

Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1876, are now complete.

City Show-Rooms and Manufactory, 147, HOUNDSDITCH, LONDON.
ESTABLISHED 1830.

LESMAHAGOW CANNEL COAL.

FERRAND DAVIES,

148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,

SOLE AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

Quotation and Analysis forwarded on application.

G. J. EVESON,

GAS COAL AND CANNEL FACTOR,

Has on offer, in quantities to suit purchasers, Best Wigan Arley Mine, Orrell Screened and Unscreened Gas Coal and Nuts; Best Yorkshire, Real Old Silkstone, Derbyshire, and North Staffordshire Screened and Unscreened Gas Coal and Nuts; also Best Lancashire, Yorkshire, Derbyshire, and other Cannel, as supplied to some of the principal Gas Companies in England, to whom references are permitted.

Analysis and Prices forwarded on application to

HEAD OFFICES, STOURBRIDGE.

N.B.—Gas Managers will oblige by advising when they will be prepared to receive Tenders.

STOURBRIDGE FIRE-BRICKS, RETORTS, CLAY, &c.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

173, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 24-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17¼ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

Established 1840.

WILSON CARTER & PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or export Best Wigan Arley Gas Coal and Nuts; best qualities of the Derbyshire, Yorkshire, and North Staffordshire Gas Coals and Nuts; also the best descriptions of Lancashire, Welsh, Scotch, and other Cannel.

Messrs. WILSON CARTER & PEARSON, being contractors to several of the principal Gas Companies in the Midland Counties, have pleasure in being enabled to give them as references.

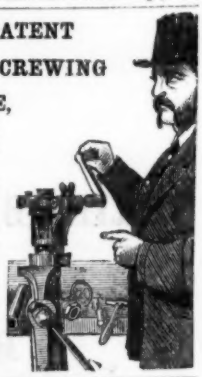
Chief Offices: Temple Buildings, 50, New Street, Birmingham.

London Offices: 6, Great Winchester St. Buildings, E.C.

GRIRDROD'S PATENT

PORTABLE PIPE SCREWING

MACHINE,



For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.

In use at the chief gas-works, and giving great satisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

W. H. BAILEY & CO.,

Brassfounders, Gauge Injector and Tool Makers,

ALBION WORKS, SALFORD,

LANCASHIRE.

ALBERT GAS COAL.

THE DERBYSHIRE

SILKSTONE COAL COMPANY,

LIMITED,

CAN OFFER A

GAS COAL

Of superior quality, delivered in trucks at any Railway Station in England, or shipped on board at Hull, Grimsby Docks, or Barrow-in-Furness.

Purified gas per ton of coal in cubic feet (average)	**10,262**
Illuminating power in candles	**15·86**
Weight of coke in lbs. per ton of coal	**1,502**

ANALYSIS AND PRICES ON APPLICATION TO

Mr. EDMUND TAYLOR, Secretary,

ALBERT COLLIERY, NEWBOLD, NEAR CHESTERFIELD.

HENRY GREENE & SON,

GAS AND HOT WATER ENGINEERS,

155, CANNON STREET, E.C.

Manufactory: 19 & 20, NICHOLAS LANE, E.C.

SUN-BURNERS,

With Regulating Valves to obviate down draught.

MEDIÆVAL & OTHER GAS-FITTINGS

For Churches and Domestic Use.

ARCHITECTS' OWN DESIGNS WORKED OUT.

ESTIMATES FREE OF CHARGE.

THE TRADE SUPPLIED.

SOLE CONSIGNEES FOR BRÖNNER'S IMPROVEMENTS IN GAS LIGHTING.

IN THE MATTER OF

BRÖNNER'S GAS-BURNERS.

HENRY GREENE AND SON, 155, Cannon Street, London, Sole Consignees for Great Britain, Ireland, and Colonies, of Brönner's Improvements in Gas Lighting, inform the public that, on the 20th of April, 1875, Julius Brönner obtained an injunction in Chancery against a defendant prohibiting him from advertising or selling as Brönner's Burners any Gas-Burner not manufactured by Julius Brönner.

Also, he obtained a similar injunction against another defendant on the 9th of November, 1875.

Also, he obtained a similar injunction against another defendant on the 13th of January, 1876.

Also, he obtained a similar injunction against another defendant on the 16th of March, 1876.

Also, he obtained a similar injunction against another defendant on the 6th of April, 1876.

HENRY GREENE AND SON invite the attention of the trade and public to the above proceedings, which they will continue to maintain against any person infringing Mr. Brönner's rights.

WEST'S GAS IMPROVEMENT COMPANY,

LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

THOMAS ALLAN & SONS,

IRONFOUNDERS,

WORKS:

SPRINGBANK FOUNDRY & NORTH WOODSIDE FOUNDRY,

GLASGOW;

BONLEA FOUNDRY, STOCKTON-ON-TEES,

Manufacturers of

CAST-IRON GAS AND WATER PIPES.

SIZES: ¾ to 12 inches at GLASGOW.

„ 1½ to 7 „ STOCKTON.

A LARGE STOCK KEPT, AND PRICES MODERATE.

Freight to London, in the Stream, 10s. per ton from Stockton; 12s. 6d. from Glasgow.

London Agent: Mr. A. C. FRASER, ST. STEPHEN'S CHAMBERS, TELEGRAPH STREET.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

LIVESEY FIRE-CLAY WORKS.

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

ORLANDO BROTHERS, LIMITED,

MANUFACTURERS OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS

EDWARD COCKEY & SONS,

GAS ENGINEERS, FROME SELWOOD,

MANUFACTURERS OF ALL DESCRIPTIONS OF

APPARATUS CONNECTED WITH GAS-WORKS.

THE ORIGINAL PATENTEES AND MANUFACTURERS OF THE

DRY-FACED VALVES

FOR PURIFIERS, GASHOLDERS, BYE-PASS, AND OTHER ARRANGEMENTS REQUIRING VALVES IN GAS-WORKS.

The Faced Valves, as made by the Patentees, continue to give great satisfaction, and they are being used extensively by many of the best gas engineers of the day.

They are more easily repaired than any other kind of Valve in use, and can be re-ground in a few hours without removal, and made perfectly gas-tight.

References can be given to many Engineers of high standing, who will testify as to the favour in which they are held.

MANUFACTURERS ALSO OF SUPERIOR WOOD GRIDS FOR PURIFIERS, SCRUBBERS, &c.

NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

"*Warrington Gaslight and Coke Company,*
Offices, Mersey Street, Warrington, April 23, 1877.

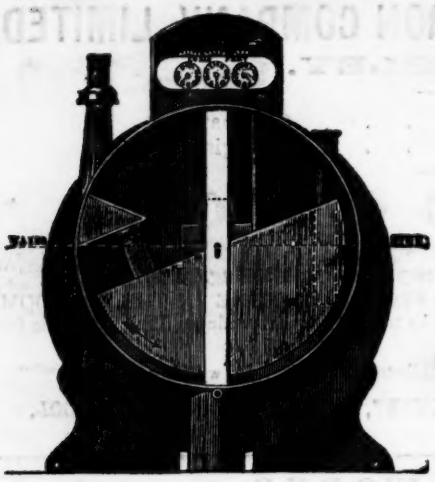
"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

"Yours truly, "JAMES PATERSON."

Full particulars will be sent on application to us—address as above.



THE

UNVARYING WATER-LINE GAS-METER.

(SANDERS AND DONOVAN'S PATENT.)

"Unquestionably the best Water Gas-Meter now in use."—THOS. G. BARLOW, C.E.

Over 120,000 in action.

MANUFACTURERS:

THE GAS-METER COMPANY, LIMITED,

KINGSLAND ROAD, LONDON;

WITH

Branch Manufactories at DUBLIN and OLDHAM.

HARRIS & PEARSON,

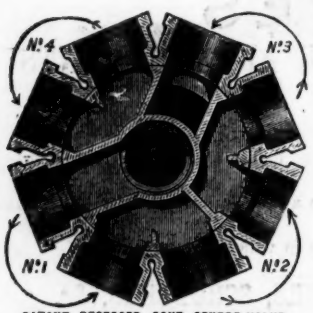
FIRE-CLAY AND BRICK WORKS, STOURBRIDGE.

GAS-RETORTS, LUMPS, TILES, & FIRE-BRICKS,

OF EVERY DESCRIPTION.

A LARGE ASSORTMENT OF GAS-RETORTS IN STOCK.

STOCK FOR EXPORT READY AT THE WORKS, AND AT ELLESMERE PORT.



PATENT RECESSED CONE CENTRE-VALVE.
Sectional Plan.

R. LAIDLAW AND SON,

EDINBURGH AND GLASGOW,

SOLE MAKERS OF

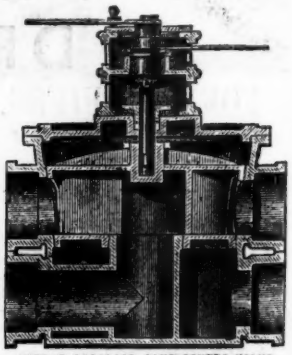
PATENT

RECESSED CONE CENTRE-VALVES,

Constructed on the principle of the ordinary Plug-Cock.

THROUGH-WAY & FOUR-WAY COCKS

Of all descriptions.



PATENT RECESSED CONE CENTRE-VALVE.
Sectional Elevation.

LONDON OFFICE: 106, CANNON STREET.

D. HULETT & CO.

Invite the attention of Gas Companies, Corporations, and others to their

PATENT STREET LAMPS,

Which are so constructed that neither putty nor other materials are required to secure the glass. No hacking out of old putty, which frequently destroys the frames. A new pane of glass can be inserted in two or three minutes by any inexperienced person, the glass being secured by a hinged flap and turn button.

PRICE 10s. each, net. Special quotations for large quantities.
Also made EXTRA STOUT recommended for its durability, PRICE 11s. 6d. each.

D. HULETT'S IMPROVED SERVICE CLEANSER,

By the use of which stoppages in service and other pipes are freed from naphthaline and other obstructions in a few minutes. PRICE 73s. net.

HULETT'S PATENT MERCURIAL REGULATOR,

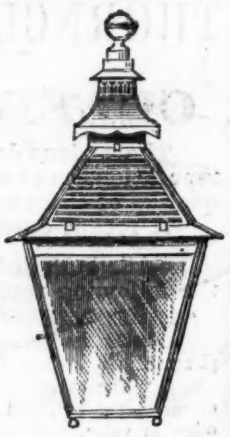
For inserting in mains, to prevent the excess of pressure in high ground, or other elevated positions.

PATENTEES OF IMPROVED WET AND DRY GAS-METERS.

Makers of all kinds of Pressure-Gauges, Gaseliers, and every kind of Gas-Fittings for the Trade.

GAS HEATING AND COOKING STOVES.

55 and 56, HIGH HOLBORN, LONDON.



London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co. 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court Fleet Street, in the City of London.—Tuesday, Sept. 11, 1877.